

Computer Networks



First Semester for Fourth Year

Faculty of Science
Sohag University
Sohag
Egypt.

2011- 2012

Dr. Essam Othman Abdel-Rahman



Introduction

➤ Introduction to Computers

➤ Hardware

- Input
 - Keyboard ,Mouse, Mice,...
- CPU
 - Motherboard, RAM, PS,....
- Output
 - Monitor, Printer, Speaker,...

➤ Software

- Operating System
 - MS-DOS, Win, Unix, Mac,...
- Application Program
 - MS-Office
 - Games
 - Language
 - Media



Introduction

- Introduction to Network
- Network Using

Companies Network

File Sharing FTP (File Transfer Protocol)

Printing Sharing

Save Time & Money

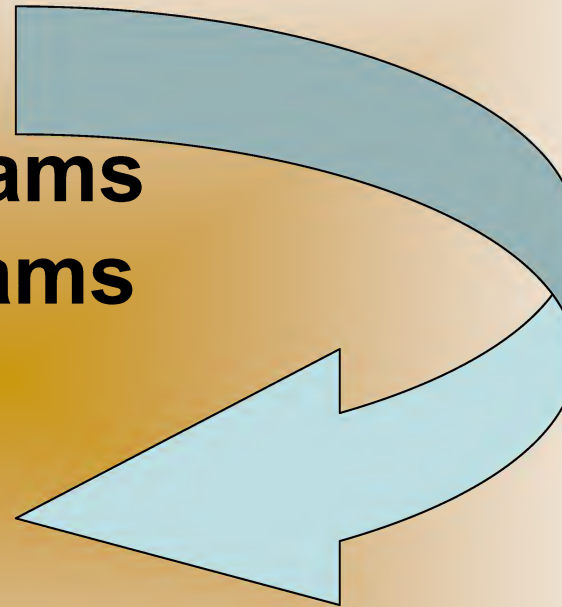
Internet & Intranet Sharing Service

Personnel Network



Programs Networks

- **E - Mail Programs**
- **Scheduling Programs**
- **Groupware Programs**



CCITT X.400

Simple Mail Transfer Protocol (SMTP)

Message Handling Service (MHS)



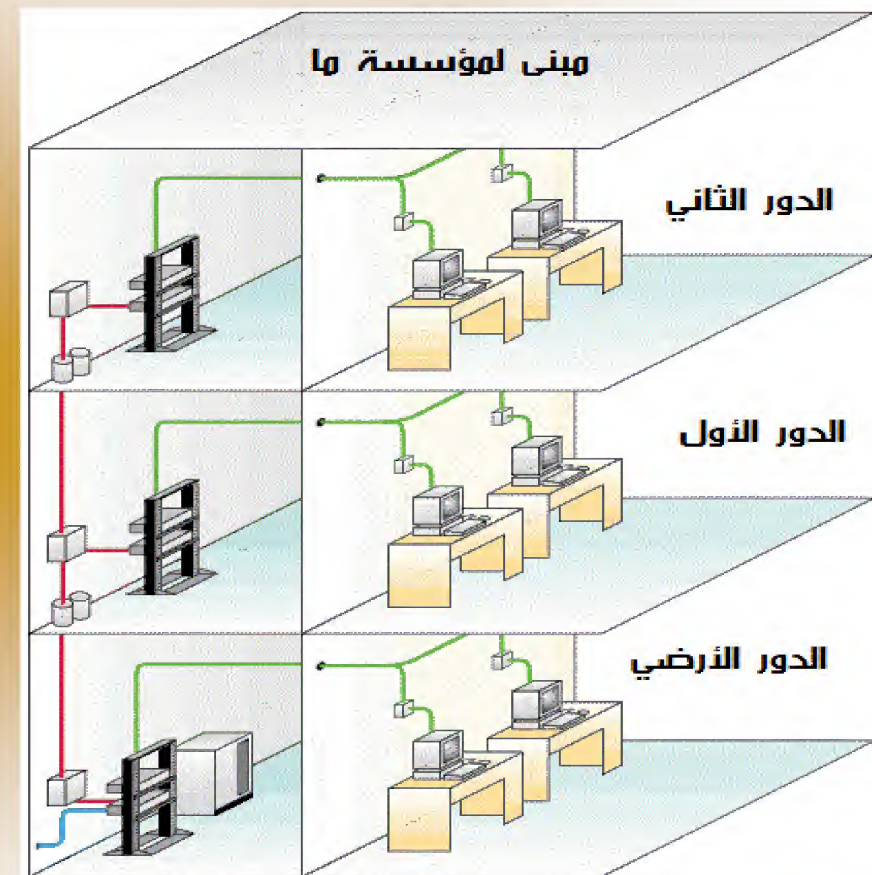
Introduction

- Network Type
- LAN (Local Area Network).
- MAN.....(Metropolitan Area Network).
- WAN(Wide Area Network).



Network Type

➤ Local Area Network

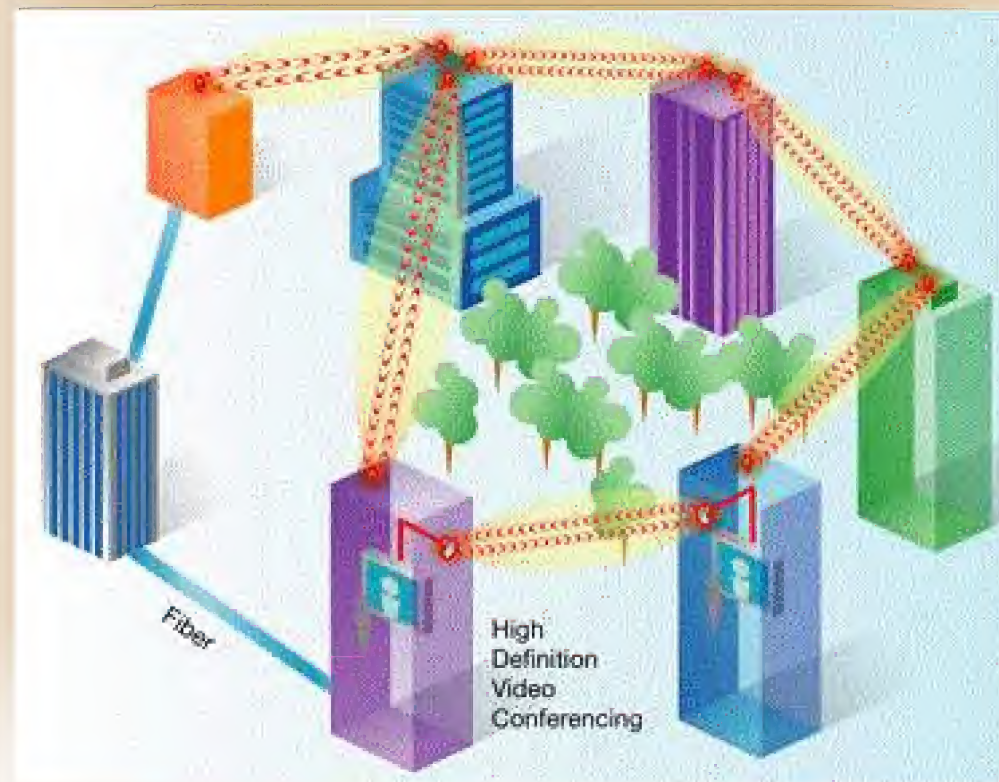


Computer Networks

2-7

Network Type

➤ Metropolitan Area Network



Network Type

➤ Wide Area Network

- **Types of WAN**
 - Enterprise Network
 - Global Network
- Types of Connection
 - Leas Line
 - Radio Waves
 - Satellite
 - Microwaves
 - Dial-up Networking

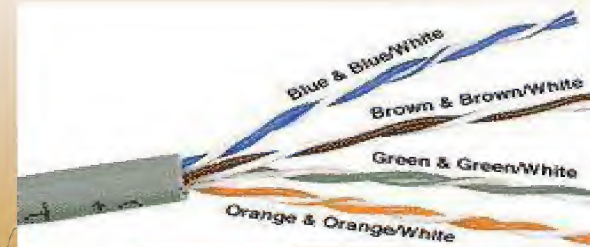


Computer Networks

1-9

Types of Cables

- Twisted Pair Cable (CAT 5 or CAT 6)



- Coaxial Cable

- Thin Coaxial
- Thick Coaxial



- Fiber Optic Cable

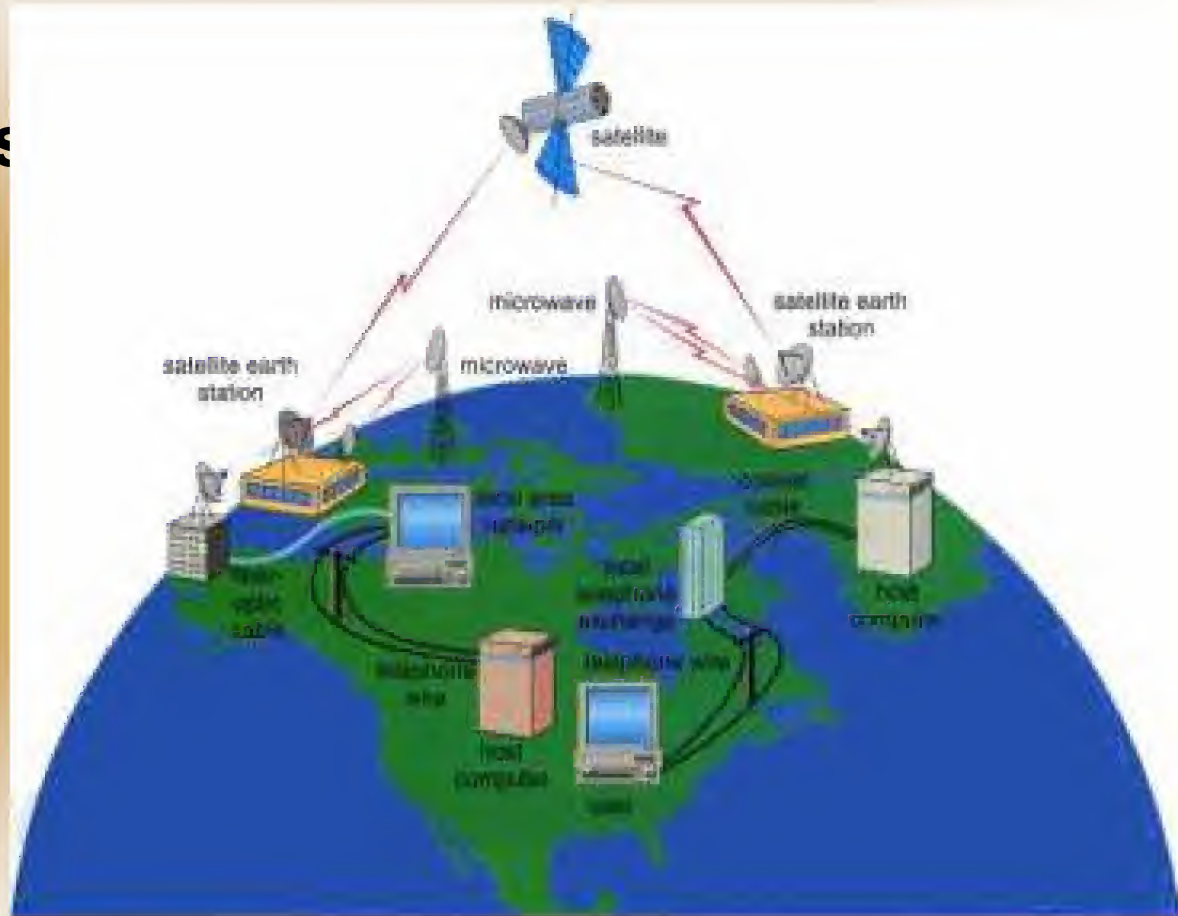


Computer Networks

1-10

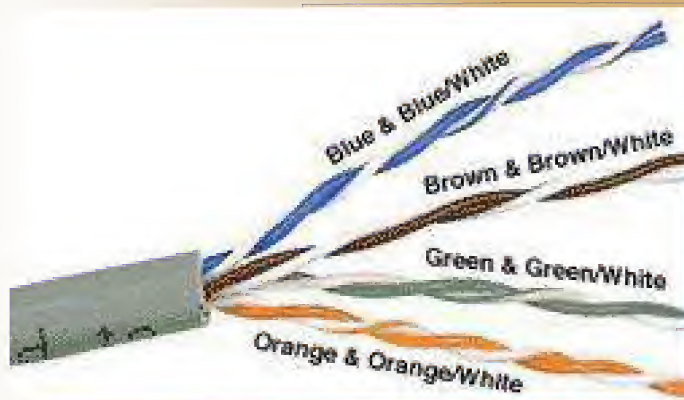
Wireless Transmission Media

- Radio Waves
- Satellite
- Microwaves



Tools to Make Network

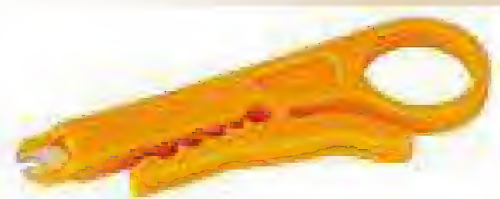
- Cables



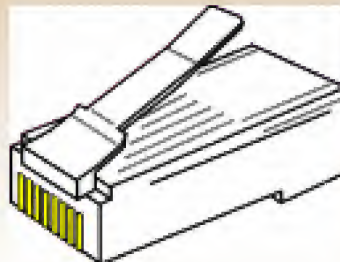
- Crimping Tool



- Peel Wire



- RJ45



Tools to Make Network

- **HUB**

Active

Passive



- **Switch**



HUB and Switch



Tools to Make Network

- Repeater



- Bridge



Tools to Make Network

- Router

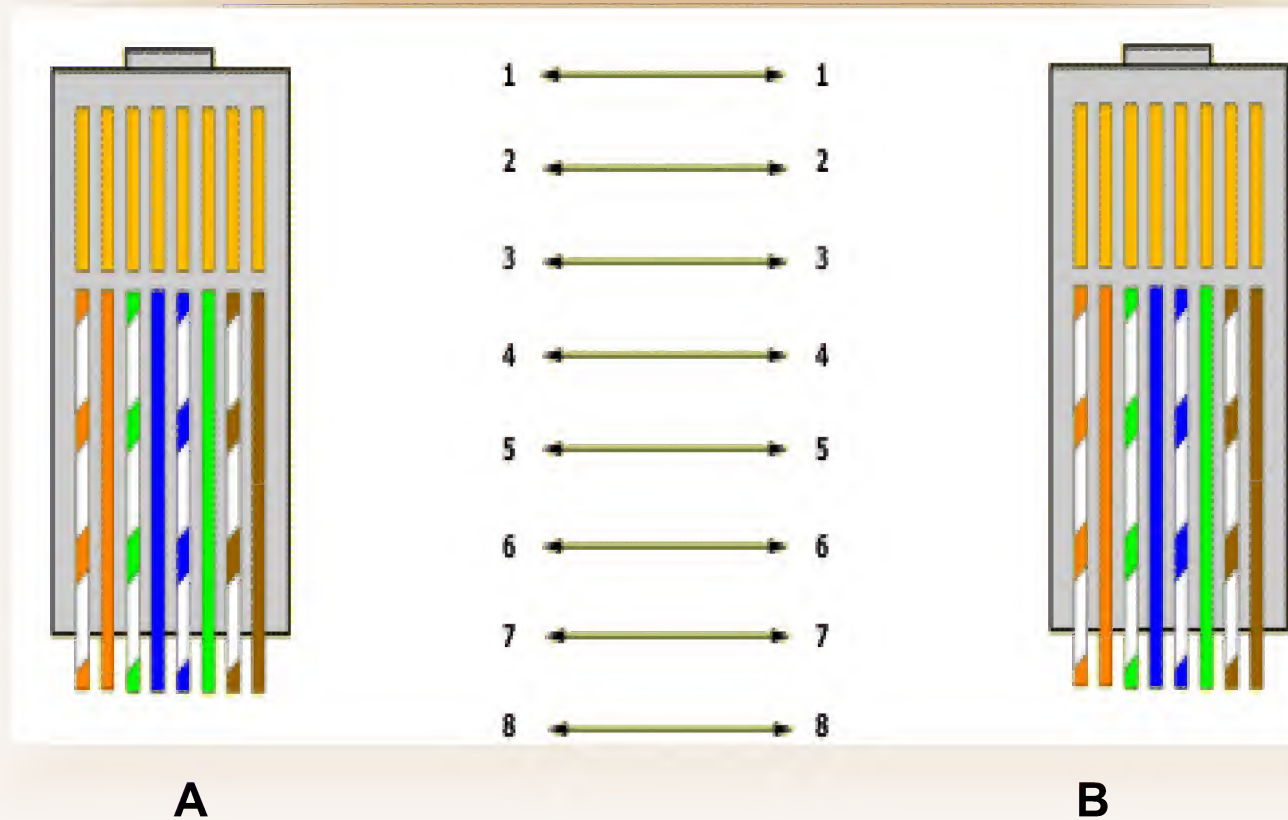


- Tester



Straight-Through Cable

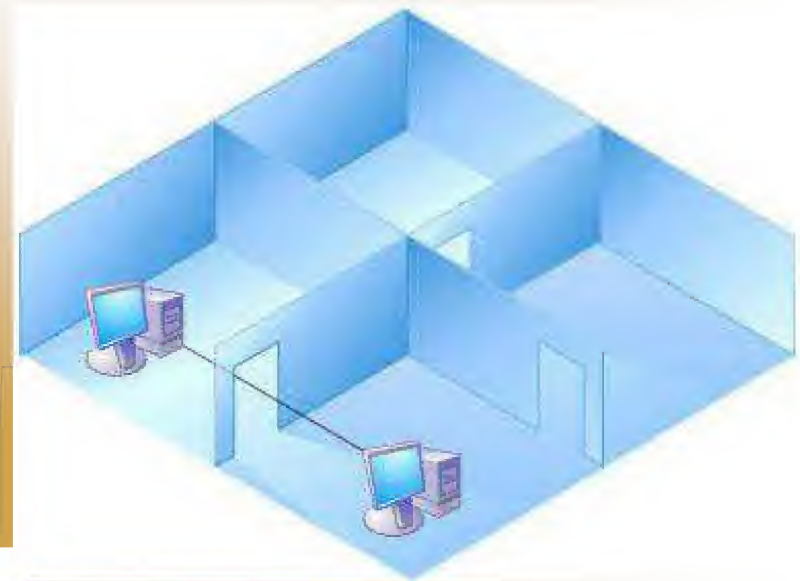
Connection Straight-Through Cable



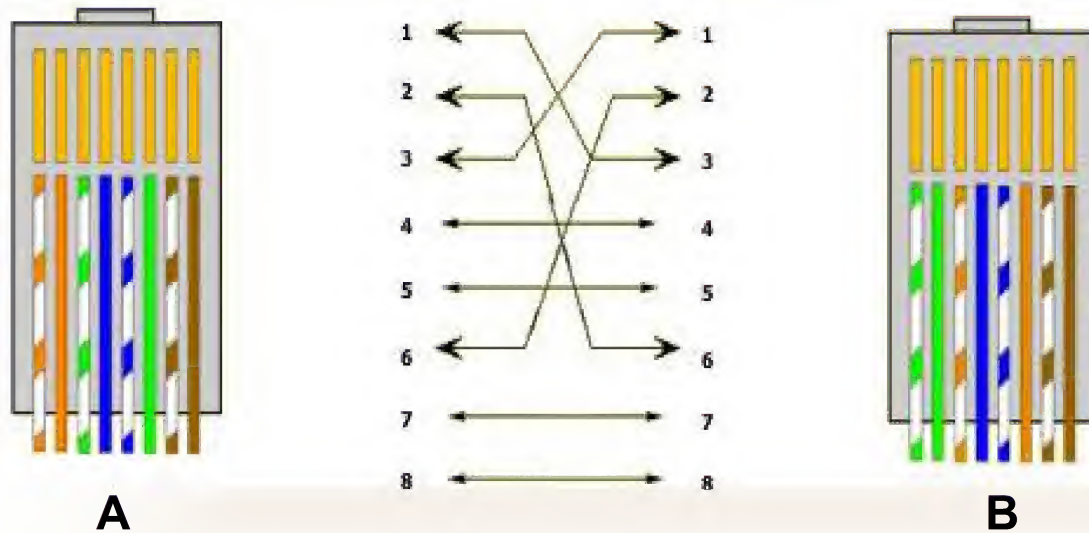
Computer Networks

1-17

Crossover Cable



Connection Crossover Cable

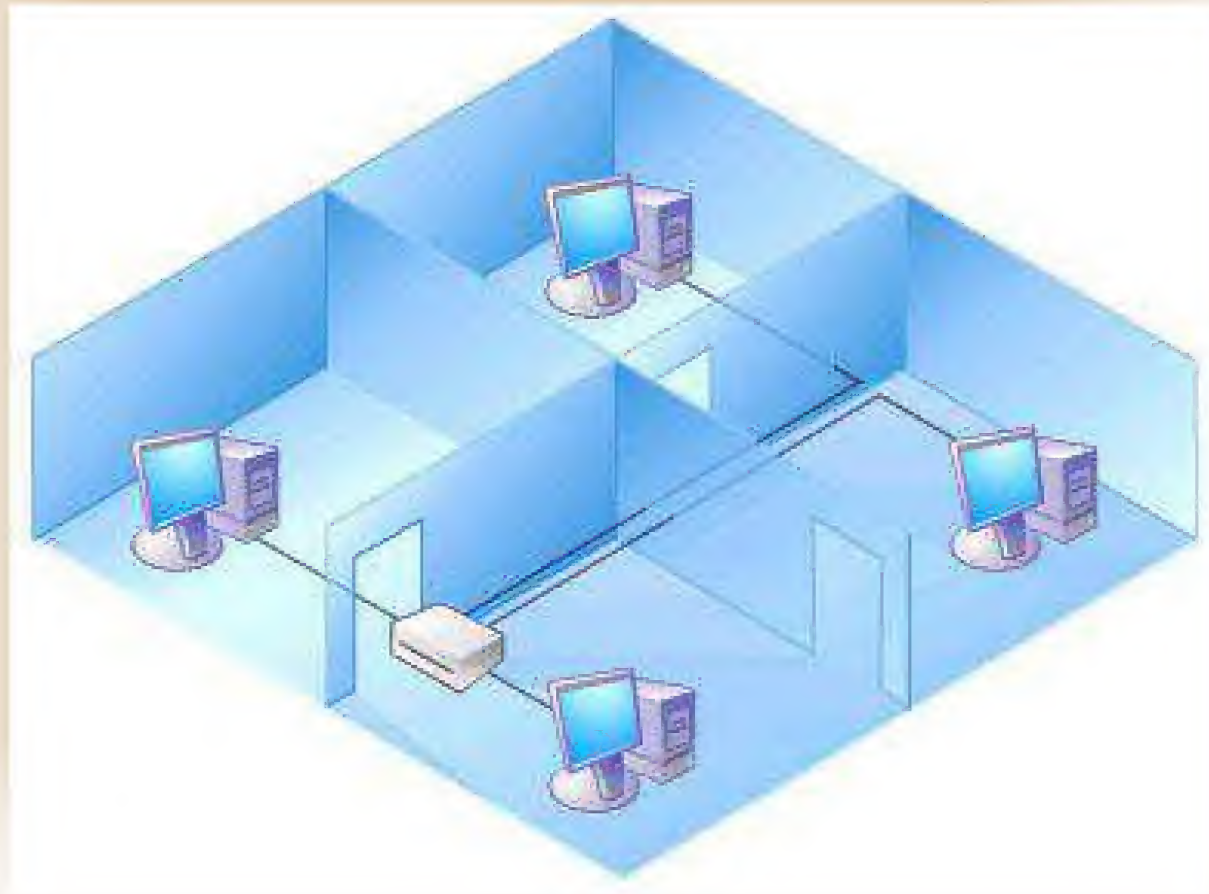


Computer Networks

1-18

Types of Networks by working

- Peer to Peer Networks

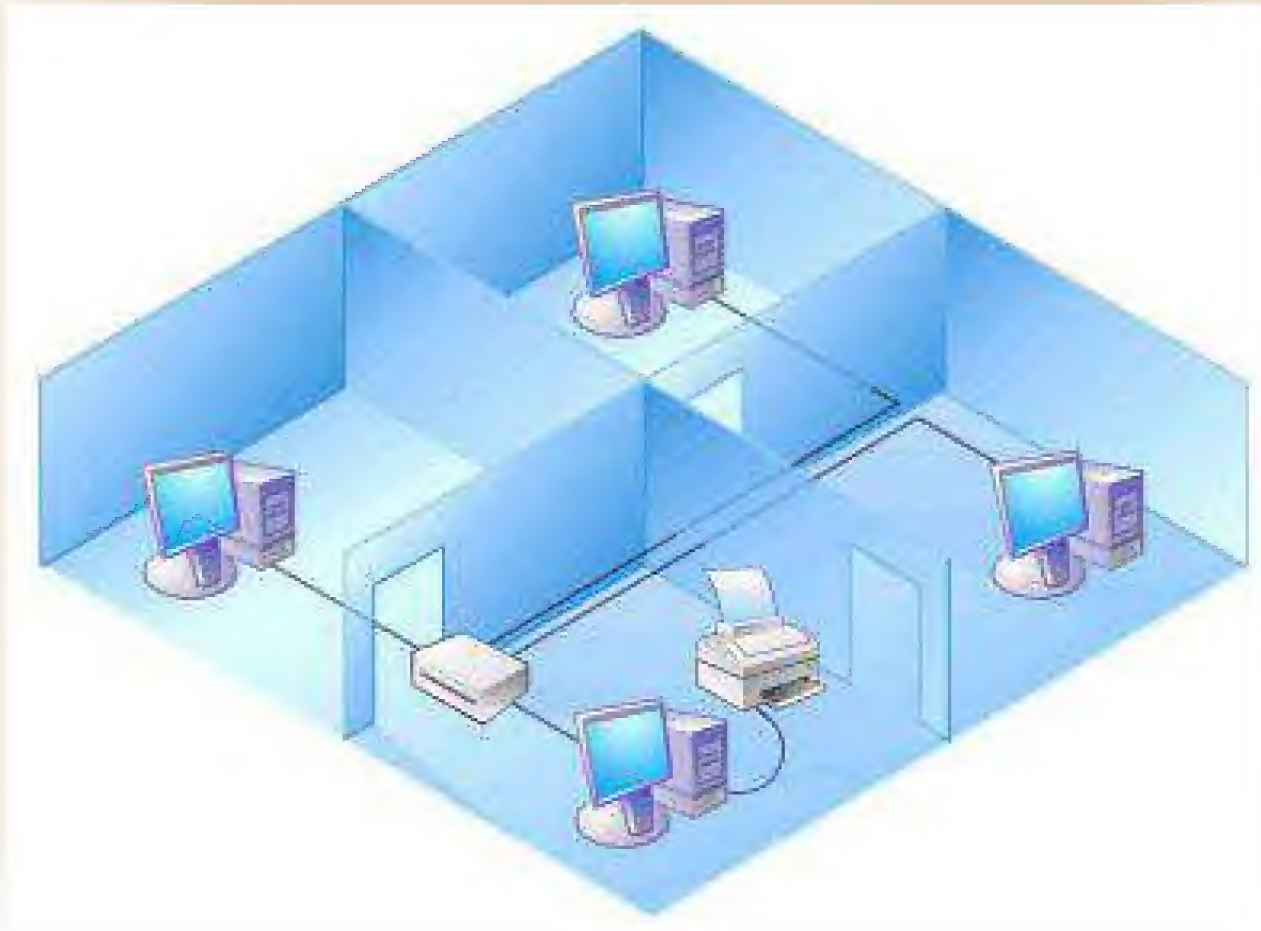


Computer Networks

1-19

Types of Networks by working

- Client\Server Networks



Types of Networks by working



Computer Networks

1-21

IP Address

Four Octets 8 Bits (0-255)

Mask

Class A

IP 0-126

Subnet Mask 255.0.0.0

Class B

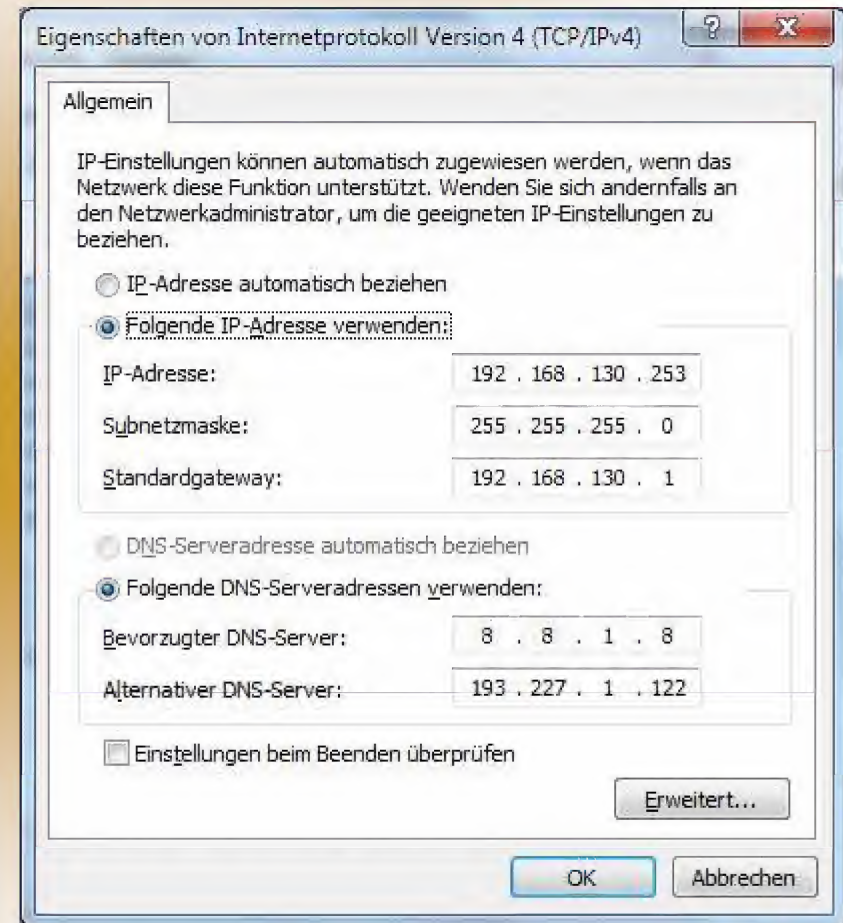
IP 128-191

Subnet Mask 255.255.0.0

Class C

IP 192-223

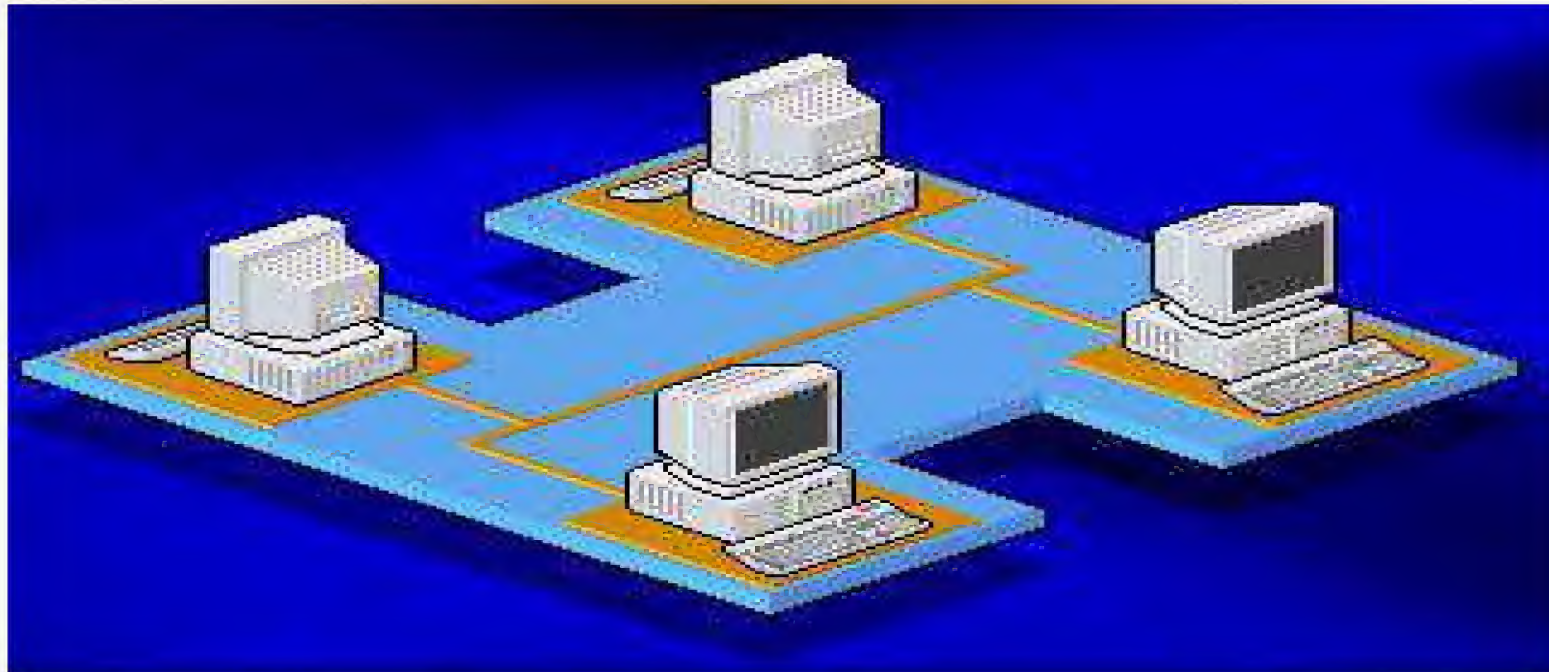
Subnet Mask 255.255.255.0



LAN Network Topology

1. Bus (Backbone or Linear Bus)
2. Ring
3. Star

Bus

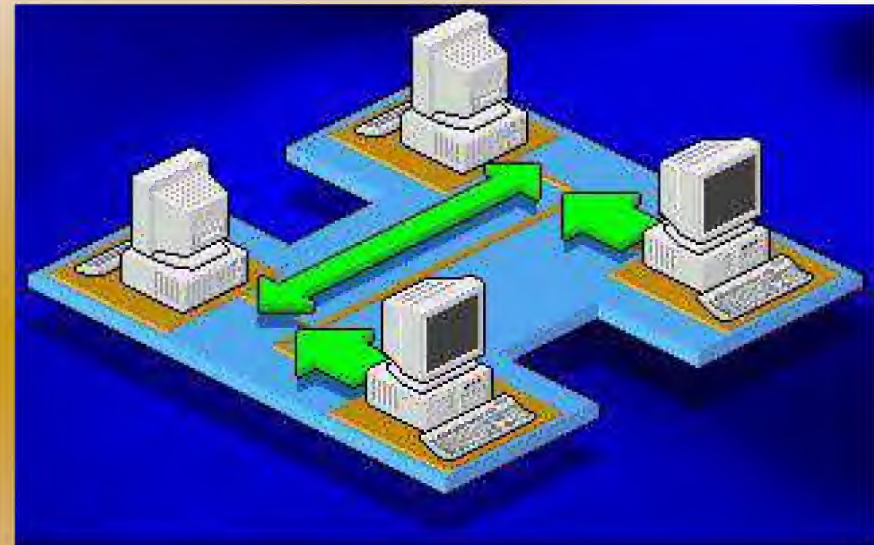
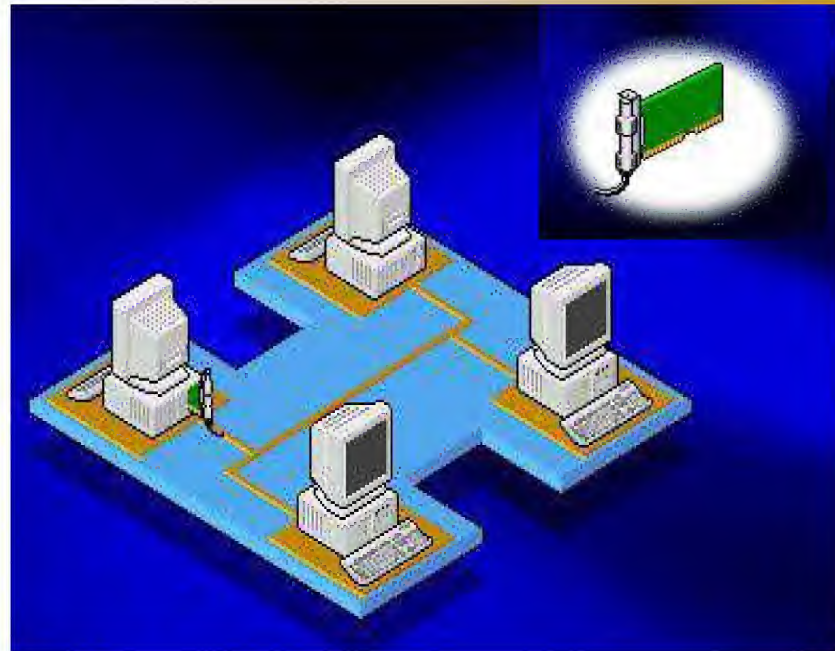


LAN Network Topology

Bus

1. Sending Signal
2. Signal Bounce
3. Terminator

Signals -- > Collision



Computer Networks

1-٢٤

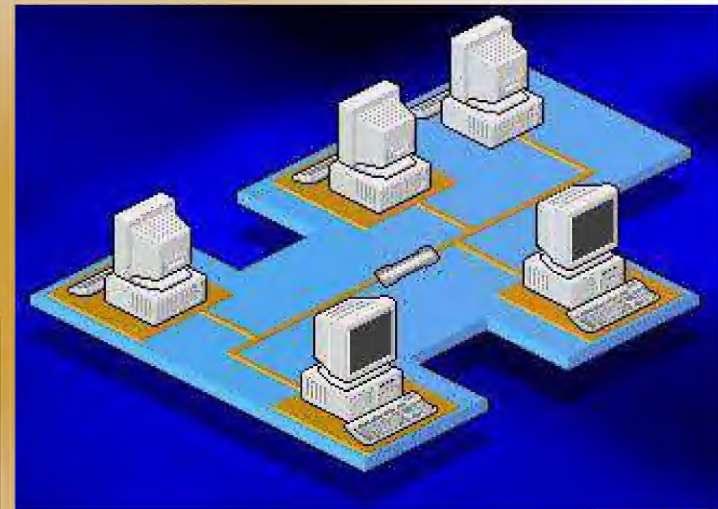
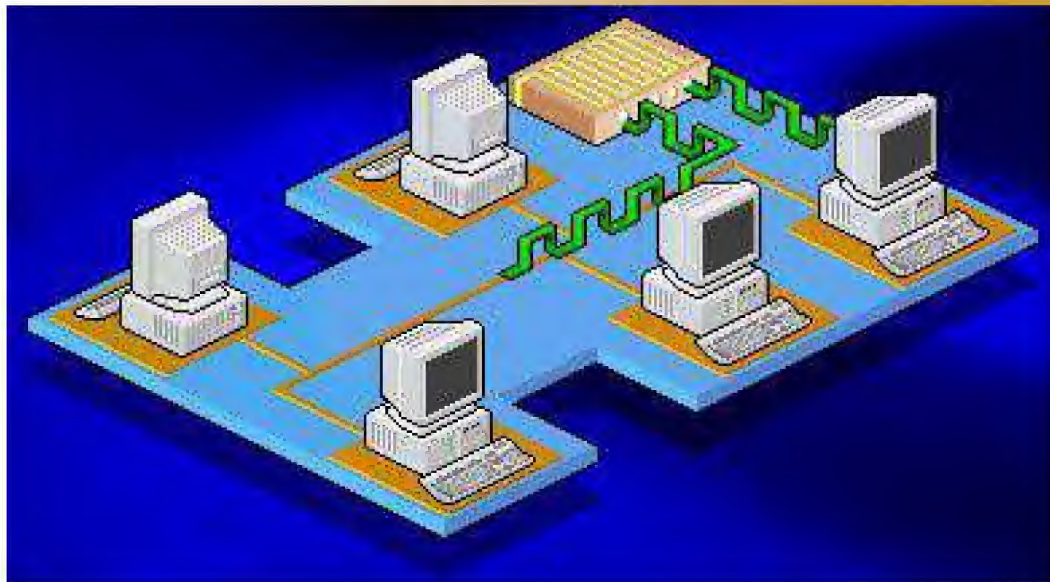
LAN Network Topology

Bus

Stopping Network is Called Network being down

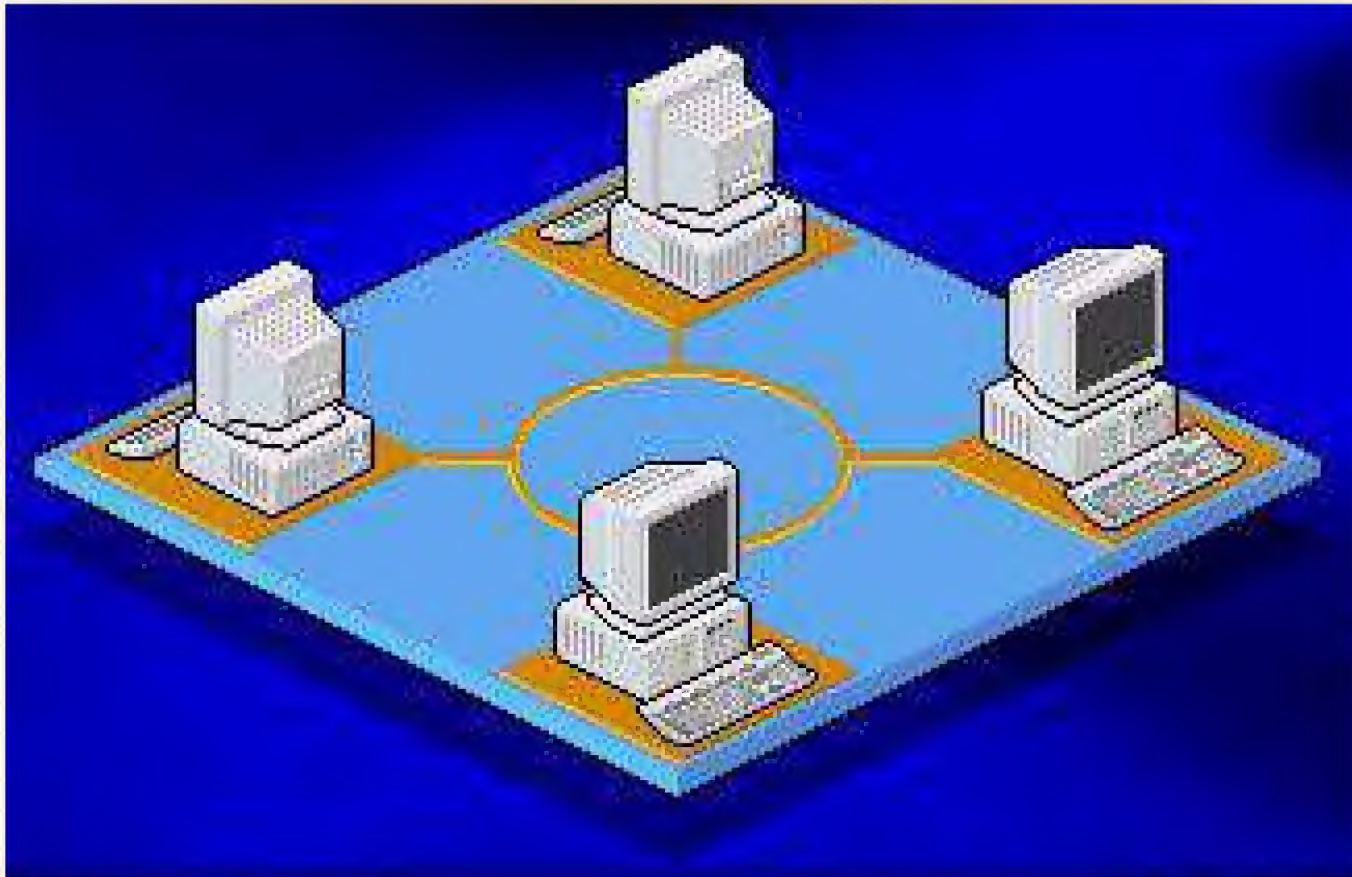
Expansion of Networks

- Barrel Connector
- Repeater



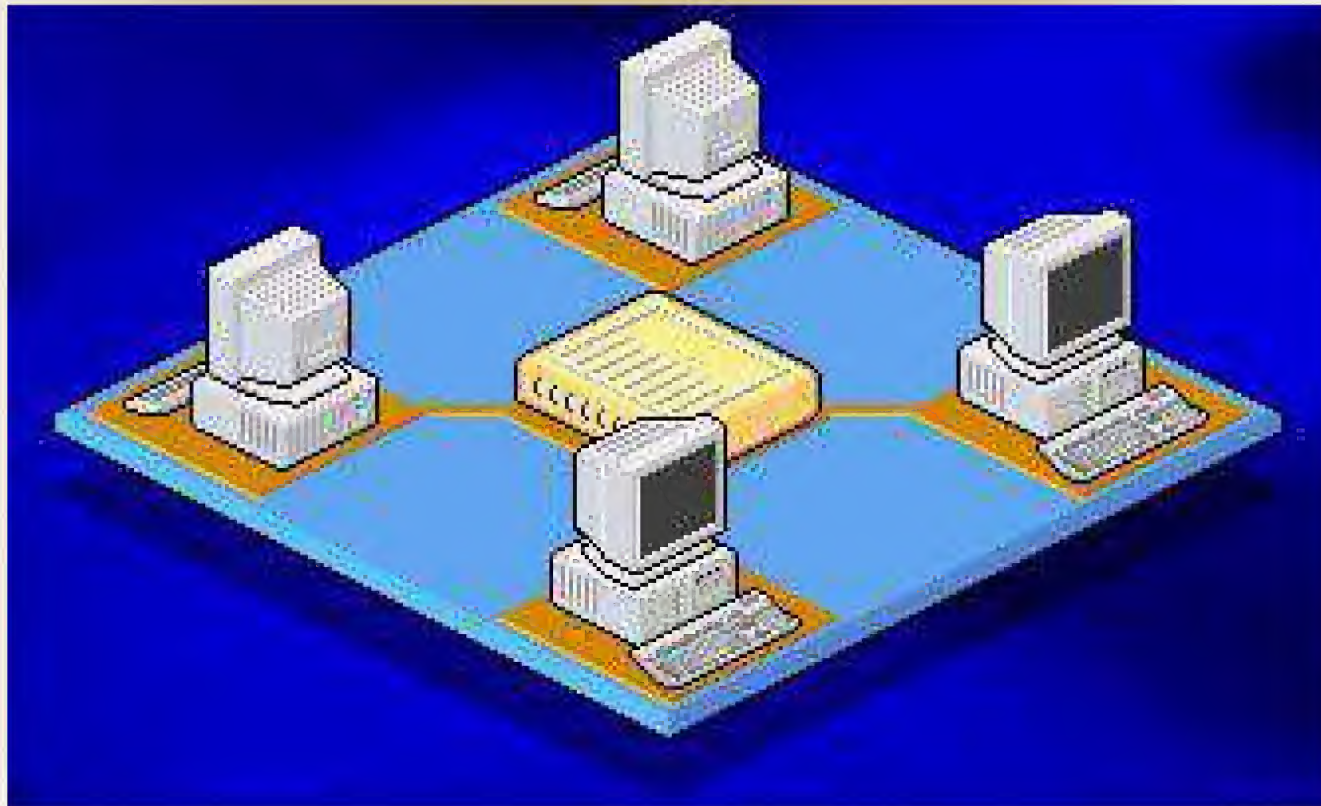
LAN Network Topology

Ring



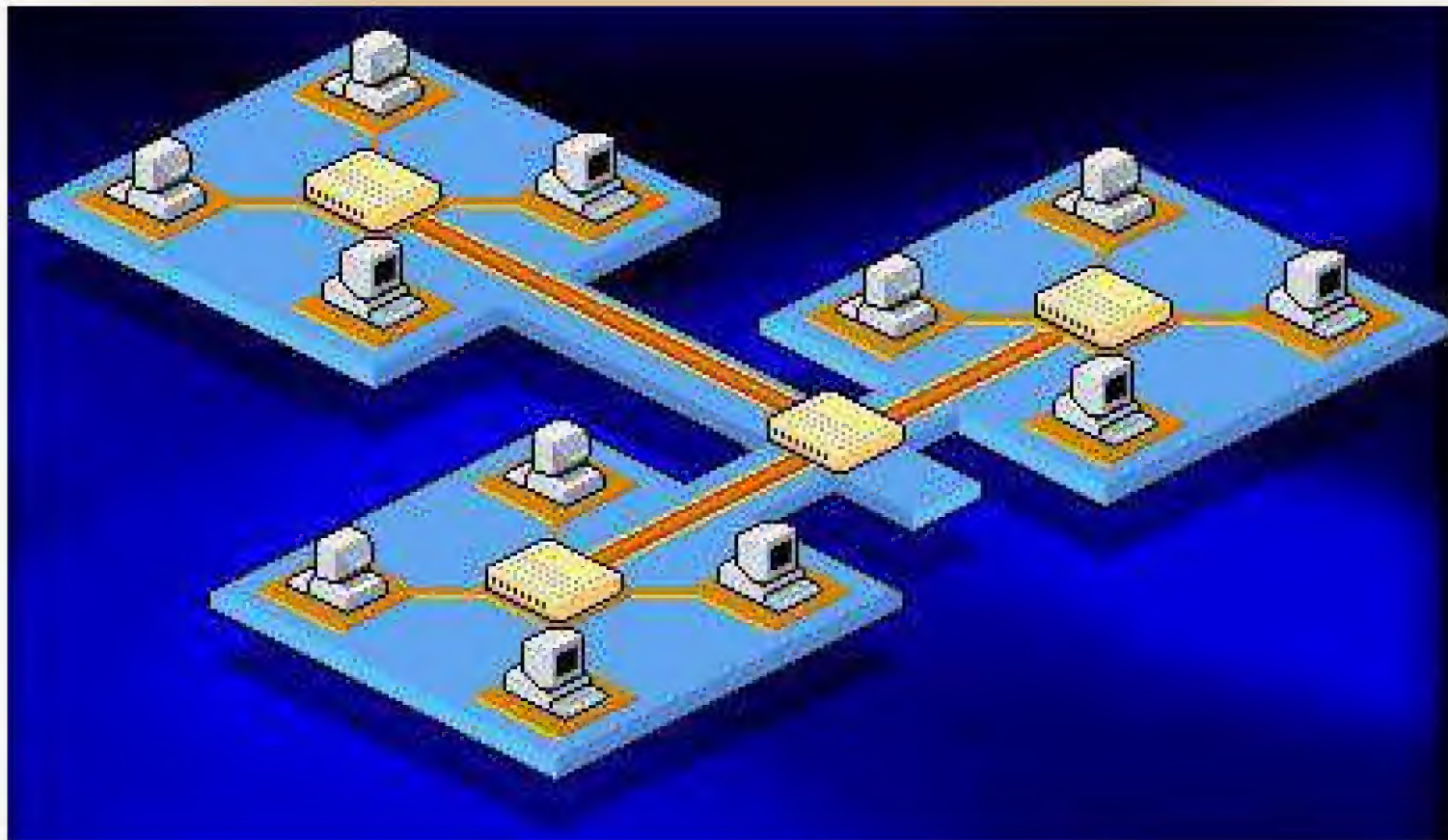
LAN Network Topology

Star



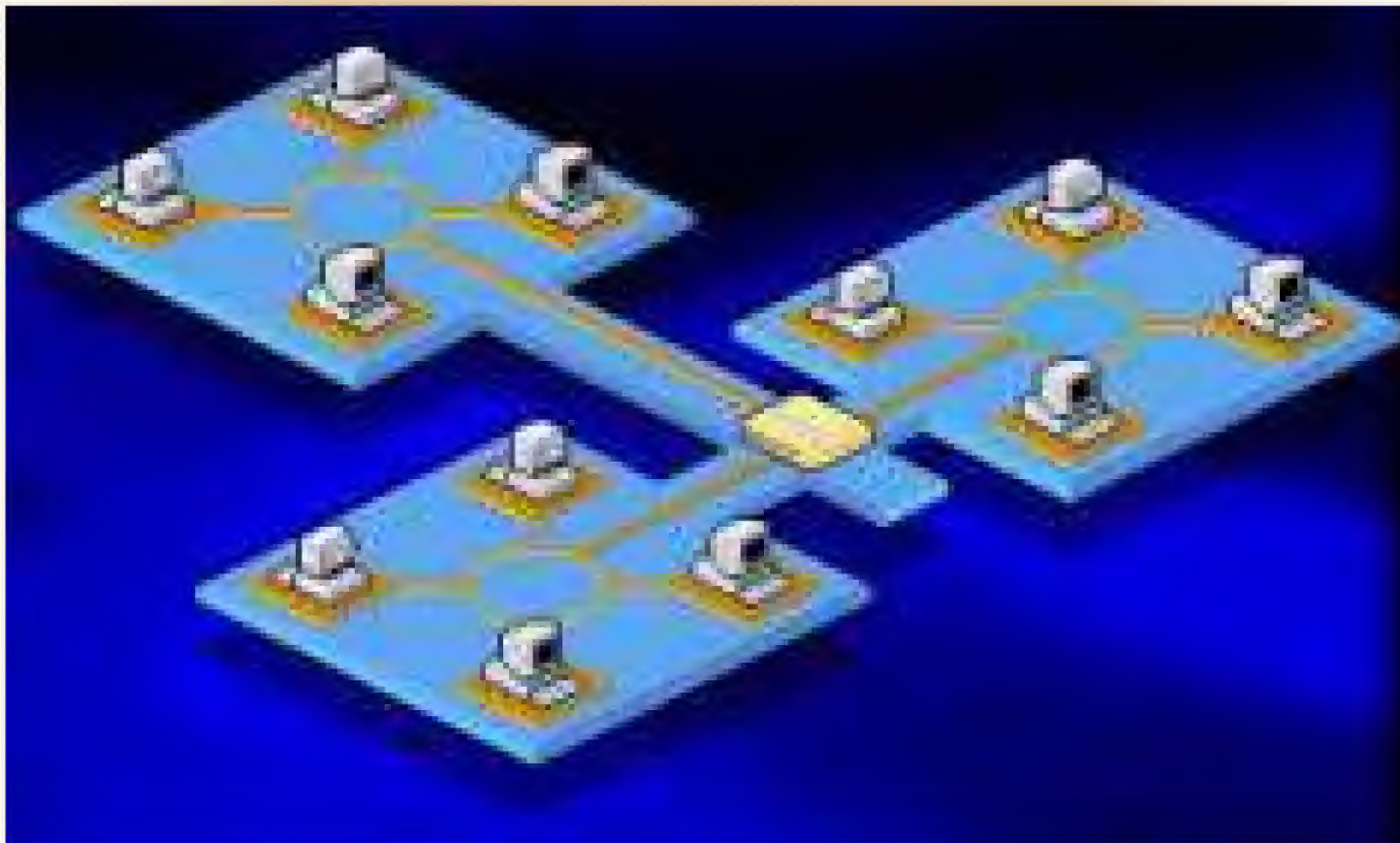
LAN Network Topology

Star Bus



LAN Network Topology

Star Ring



Computer Networks



First Semester for Fourth Year

Faculty of Science
Sohag University
Sohag
Egypt.

2011- 2012

Dr. Essam Othman Abdel-Rahman



Computer Networks

1-30

Method of Connection Between Two Computers

Requirements

- Two Computers
- Network Cards
- Cross Over Cable not Straight-Through Cable

• The Connection

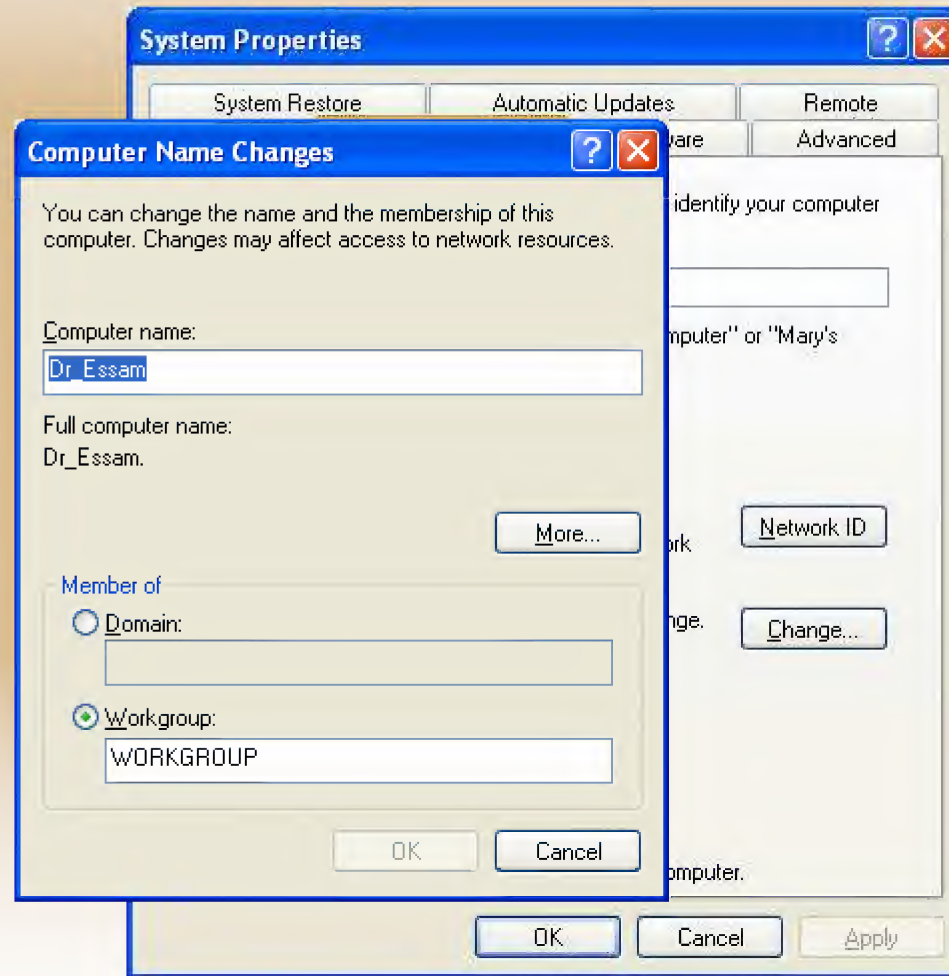


Computer Networks

1-31

Method of Connection Between Two Computers

- Computer Name



Computer Networks

1-٣٢

Method of Connection Between Two Computers

- My Network Places

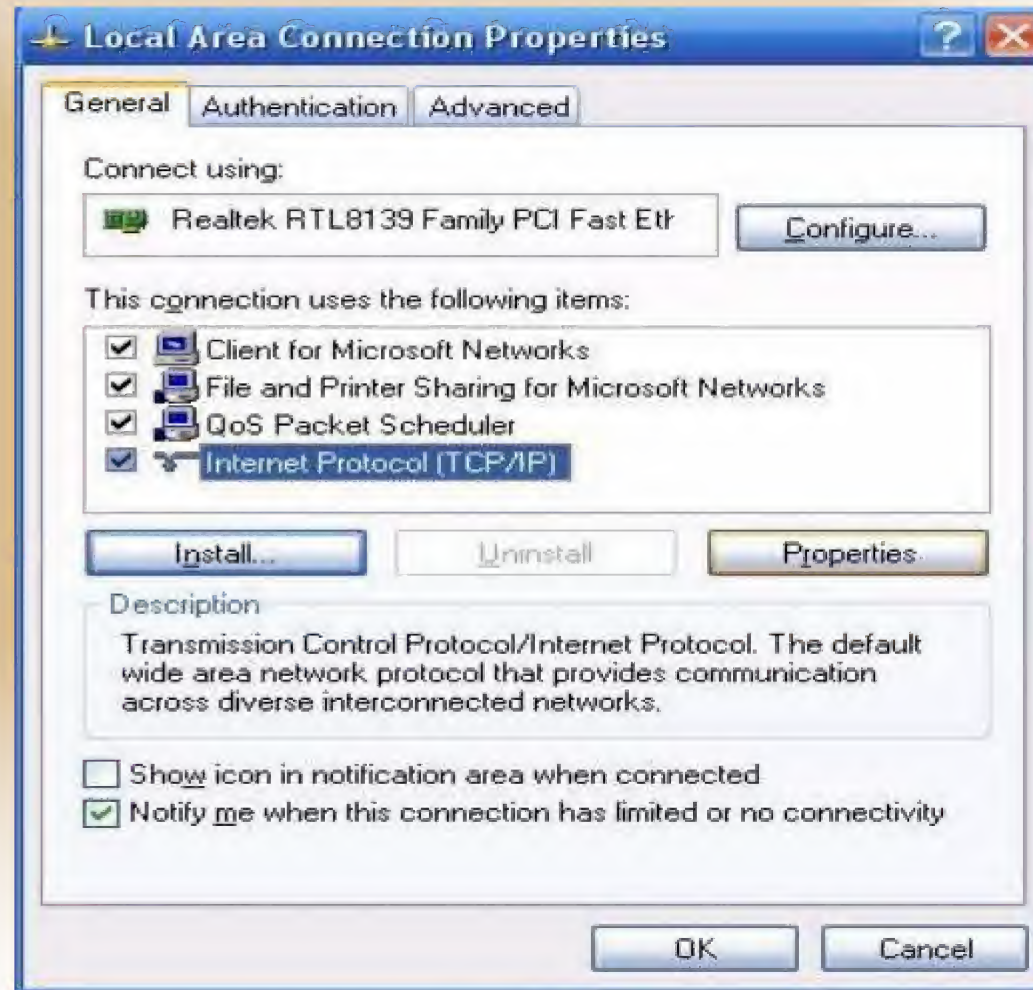


Computer Networks

1-٣٣

Method of Connection Between Two Computers

- My Network Places

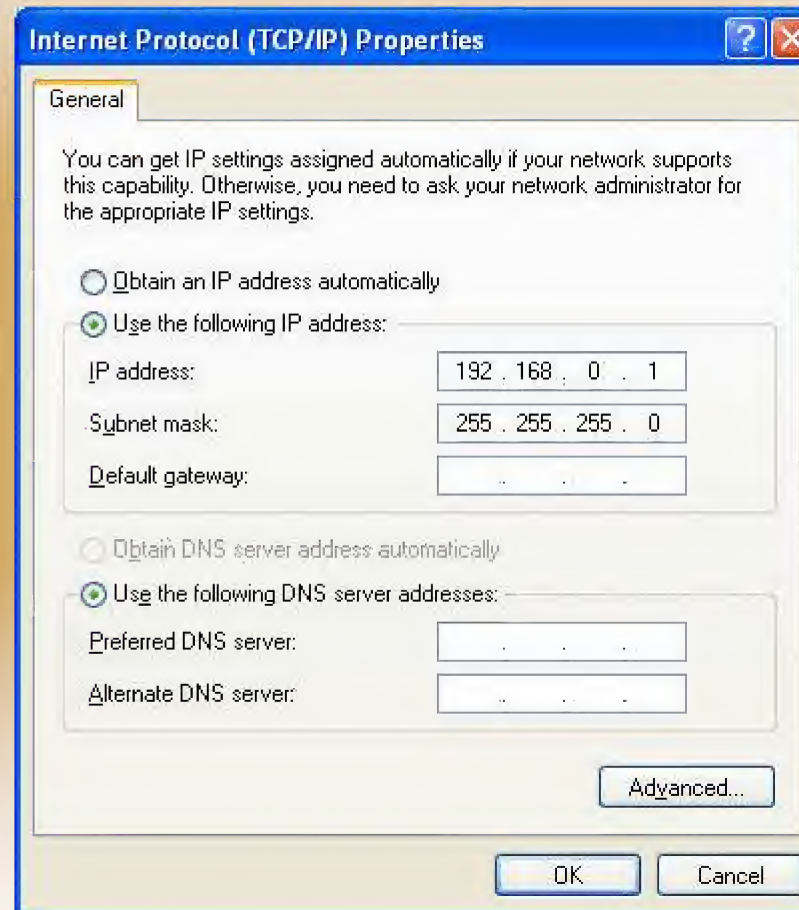


Computer Networks

1-34

Method of Connection Between Two Computers

- My Network Places

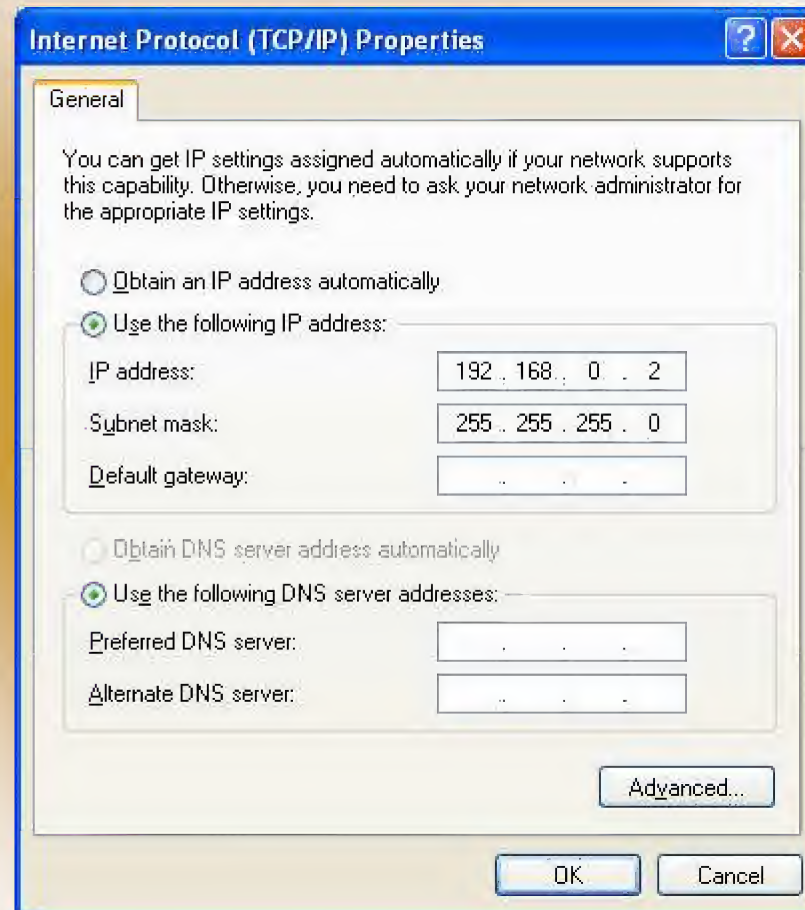


Computer Networks

1-30

Method of Connection Between Two Computers

- Another Computer
- Same steps in another computer but we choose different number in fourth Octet in IP address
For Example



Computer Networks

1-36

Method of Connection Between Two Computers

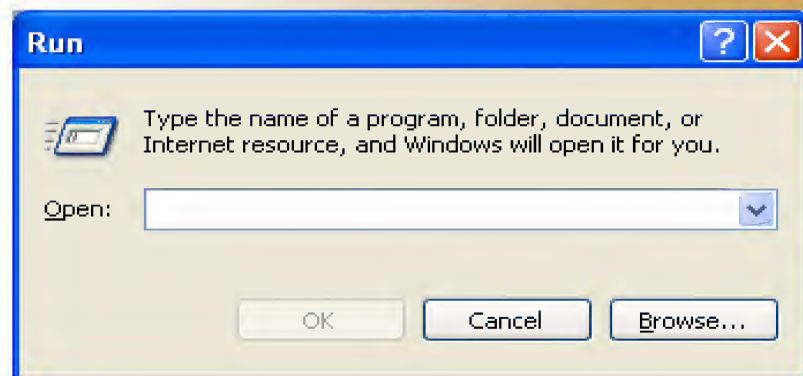


Computer Networks

1-٣٧

Method of Connection Between Two Computers

- Ping



Method of Connection Between Two Computers

Ping [-t] [-a] [-n] [-l] [-f] [-i] [-v] [-r] [-s] [-w] [-j]

-t استمر بالإرسال للعنوان المطلوب حتى يتوقف عن الإجابة وإذا أردنا مقاطعة الإحصائيات وعرضها نضغط

CTRL+Break وللمقاطعة **Ping** وإنهائه نستخدم **CTRL+C**

-a اعرض رقم التعريف للعنوان المحدد.

-n عدد رسائل طلب الارتداد المرسل (حزم البيانات المرسل) والافتراضي هو 4.

-l حجم حزمة البيانات المرسل محدد بـ **Bytes** و الحجم الافتراضي للحزمة هو 32 والأقصى هو 65.527.

-f عدم تجزئة الحزمة المرسل (**Do not fragment**) من قبل أجهزة التوجيه في المسار إلى الوجهة المقصودة.

-I المدة الزمنية بين كل حزمة والثانية تقاس بالملي ثانية.

-v نوع الخدمة والافتراضي هو 0 ويتم تحديده كقيمة عشرية تتراوح من 0 إلى 255.

-r عدد نقاط التحويل أو القفزات في خط الاتصال بالعنوان وعند استخدام هذا المعيار فقد استخدمت **Record**

Route وذلك لتسجيل المسار المتخذ من قبل رسالة الطلب حتى رسالة الإجابة المتوافقة للطلب.

-S الوقت المسجل عند الوصول لكل قفزة أو تحويل (وقت وصول رسالة طلب الارتداد ورسالة الإجابة المتوافقة).

-W مدة الانتظار لوصول الرد من العنوان بالملي ثانية وإن لم يتم استلام رسالة الإجابة يتم عرض رسالة إعلام بالخطأ

"انقضاء مهلة الطلب" **Request timed out** والمهلة الافتراضية 4000 (4ثواني)

-j لتحديد عدد من الوجهات التي تمر بها حزمة البيانات خلال مسارها للوصول إلى المقصد والعدد الأقصى لهذه

الوجهات هو 9 وتكتب قائمة المضيقين بعنوانين **IP** مفصولة بفاصلات.

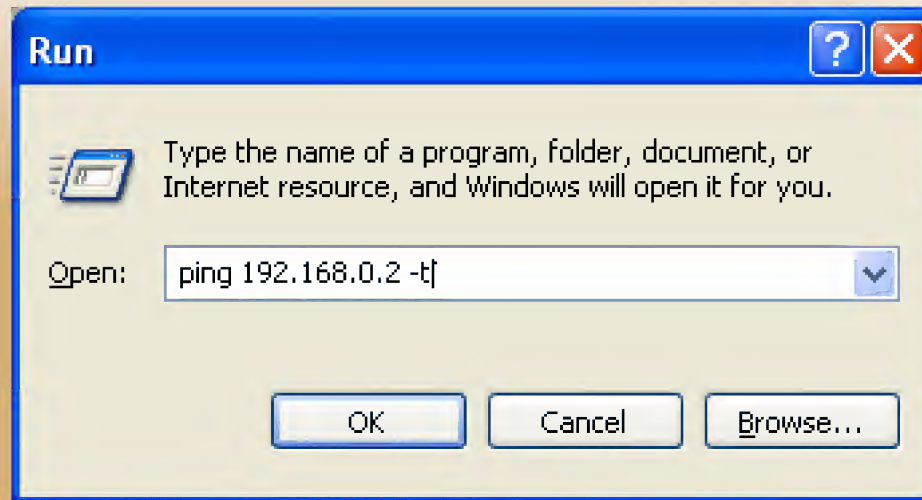


Computer Networks

1-39

Method of Connection Between Two Computers

- Ping



```
C:\WINDOWS\System32\ping.exe

Pinging pc01 [192.168.0.2] with 32 bytes of data:
Reply from 192.168.0.2 : bytes=32 time<1ms TTL=128
Reply from 192.168.0.2 : bytes=32 time<1ms TTL=128
Reply from 192.168.0.2 : bytes=32 time<1ms TTL=128
Reply from 192.168.0.2 : bytes=32 time<1ms TTL=128
```

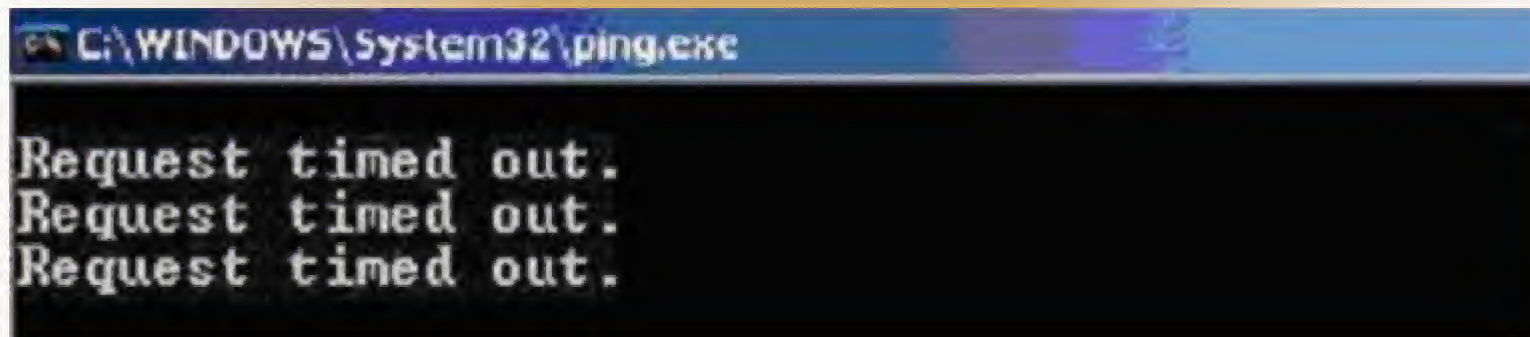
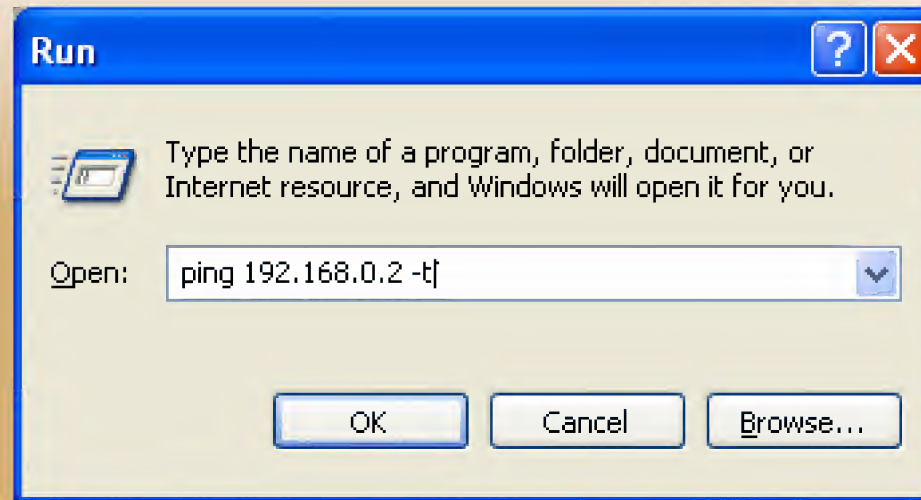


Computer Networks

1-4

Method of Connection Between Two Computers

- Ping

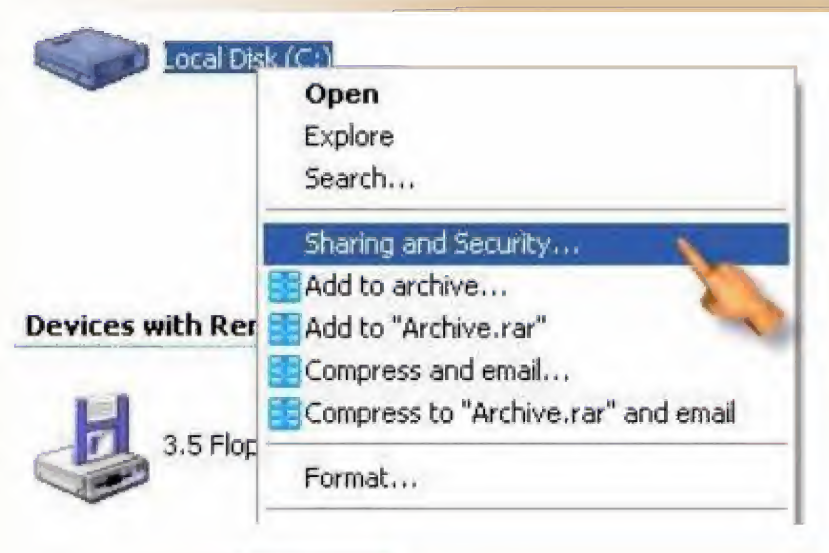


Computer Networks

1-41

Method of Connection Between Two Computers

- Sharing



Computer Networks

1-٤٢

Method of Connection Between Two Computers

- Printers and Faxes Sharing



Computer Networks

1-٤٣

Method of Connection Between Two Computers

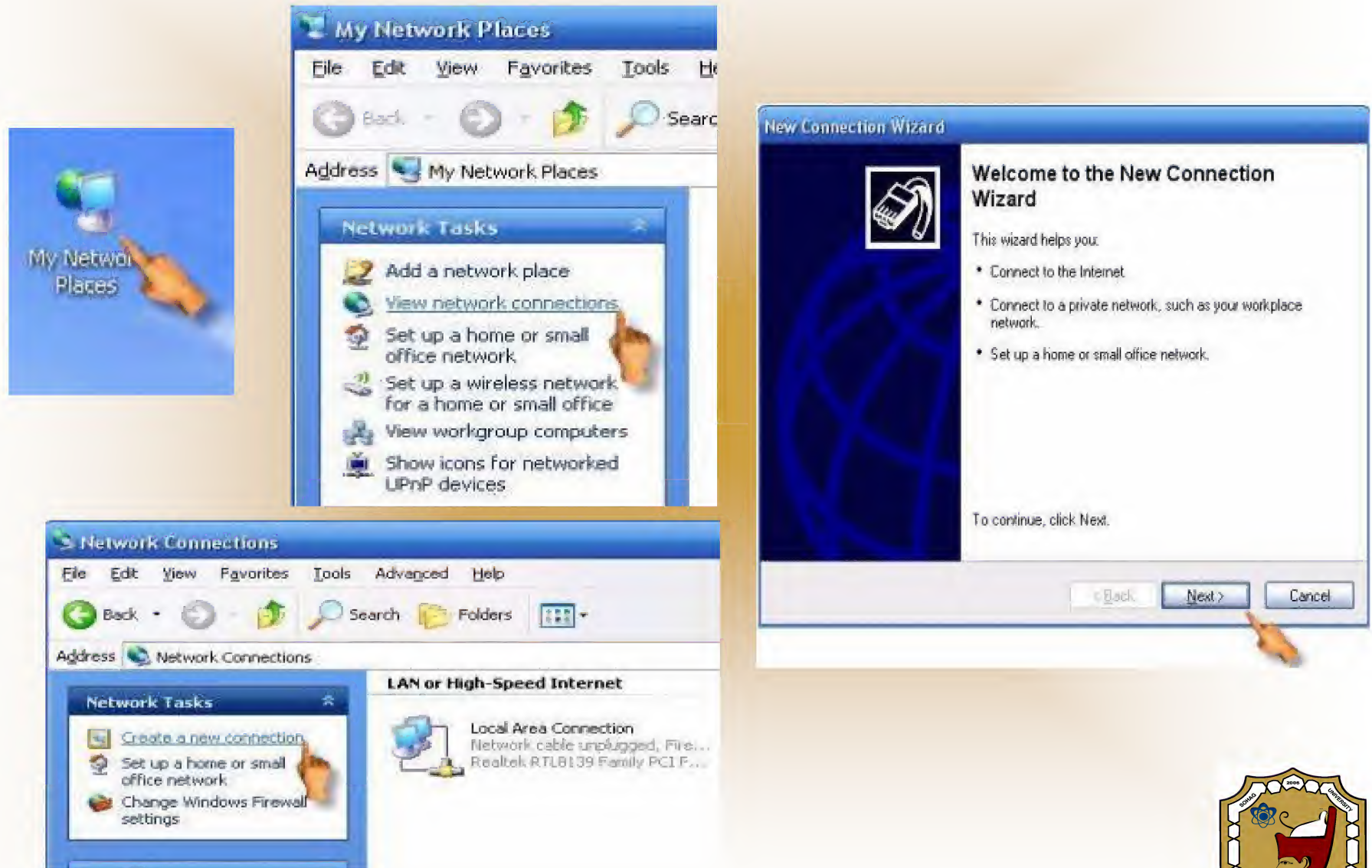
- Printers and Faxes Sharing



Computer Networks

1-44

Connection of Dial up Network



Computer Networks

1-٤٥

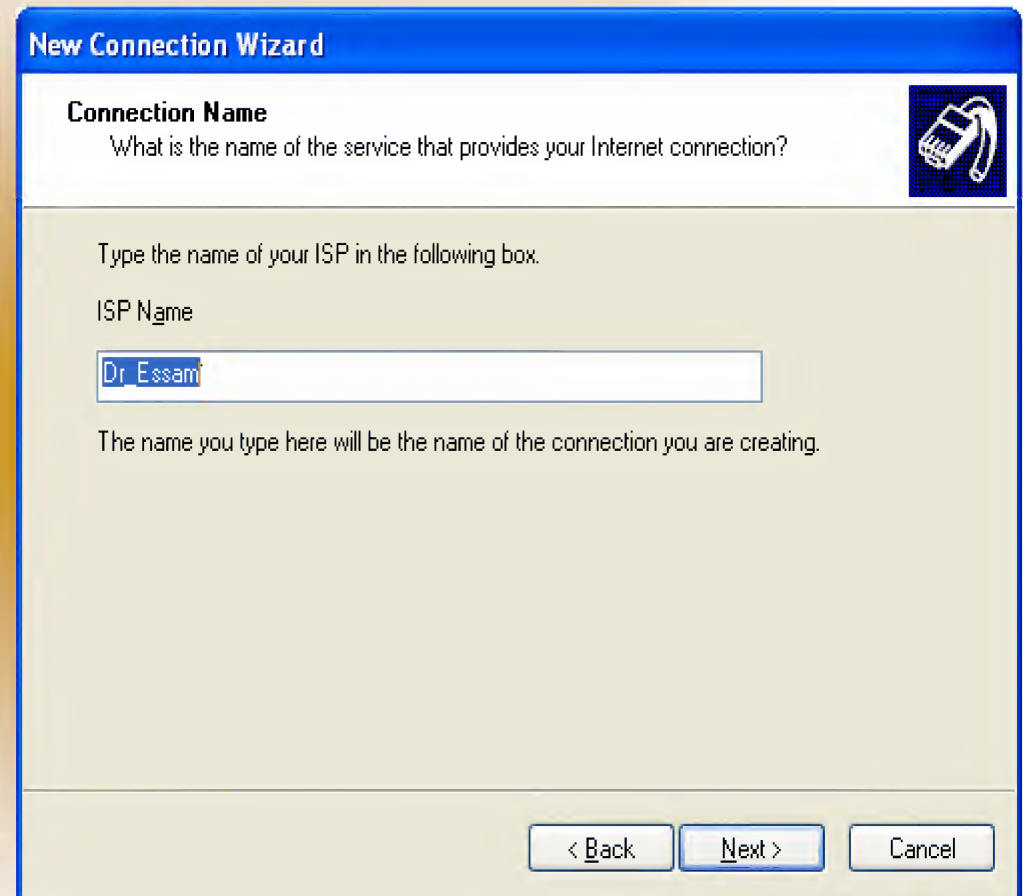
Connection of Dial up Network



Computer Networks

1-٤٦

Connection of Dial up Network



Computer Networks

1-٤٧

Connection of Dial up Network

New Connection Wizard

Phone Number to Dial
What is your ISP's phone number?

Type the phone number below.

Phone number:

You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.

< Back Next > Cancel

New Connection Wizard

Internet Account Information
You will need an account name and password to sign in to your Internet account.

Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)

User name:

Password:

Confirm password:

☒ Use this account name and password when anyone connects to the Internet from this computer

☒ Make this the default Internet connection

< Back Next > Cancel



Computer Networks

1-٤٨

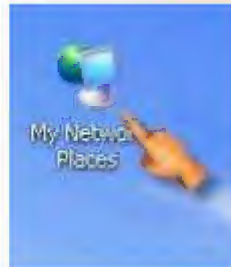
Connection of Dial up Network



Computer Networks

1-49

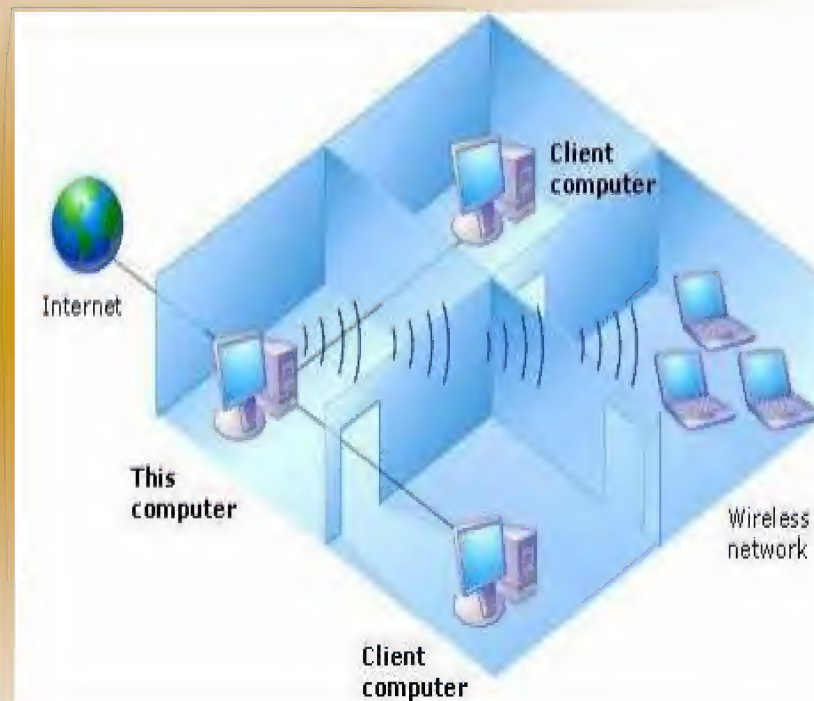
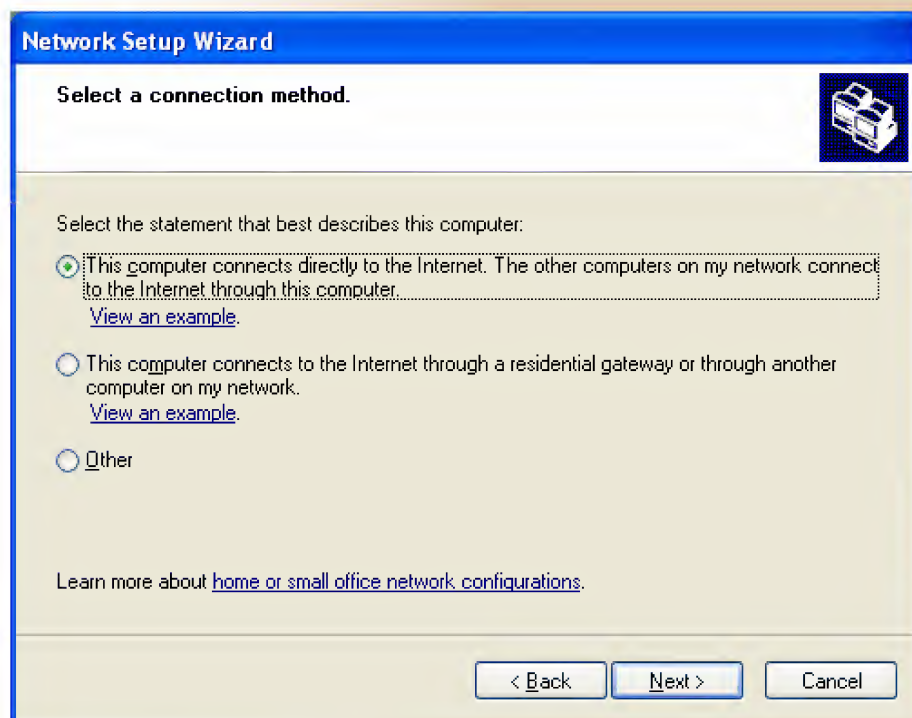
Sharing Connection of Dial up Network



Computer Networks

1-00

Sharing Connection of Dial up Network



Computer Networks

1-٥١

Sharing Connection of Dial up Network

Network Setup Wizard

Select your Internet connection.

Select your Internet connection from the following list.

Connections:

Essam	TOSHIBA Software Modem
1394 Connection	1394 Net Adapter
Wireless Network Connection	Intel(R) Wireless WiFi Link 4965AGN
Local Area Connection	Realtek RTL8139/810x Family Fast Ethernet NIC

Learn more about [how to determine your Internet connection](#).

< Back Next > Cancel

Network Setup Wizard

Give this computer a description and name.

Computer description:
Examples: Family Room Computer or Monica's Computer

Computer name:
Examples: FAMILY or MONICA

The current computer name is PROFESSOR-F5E7D9.

Some Internet Service Providers (ISPs) require that you use a specific computer name. This is often true for computers with a cable modem.

If this is the case for your computer, do not change the computer name provided by your ISP.

Learn more about [computer names and descriptions](#).

< Back Next > Cancel



Computer Networks

1-٥٢

Sharing Connection of Dial up Network

Network Setup Wizard

Name your network.

Name your network by specifying a workgroup name below. All computers on your network should have the same workgroup name.

Workgroup name:

Examples: HOME or OFFICE

< Back Next > Cancel

Network Setup Wizard

File and printer sharing

Turning on file and printer sharing makes the Shared Documents folder available to everyone on your network. It also gives everyone access to a shared printer if one is available.

What do you want to do?

☒ Turn on file and printer sharing
Windows Firewall will be configured to allow file and printer sharing on your network.

☐ Turn off file and printer sharing
Windows Firewall will block file and printer sharing on your network. If you currently have shared files or printers, they will no longer be shared.

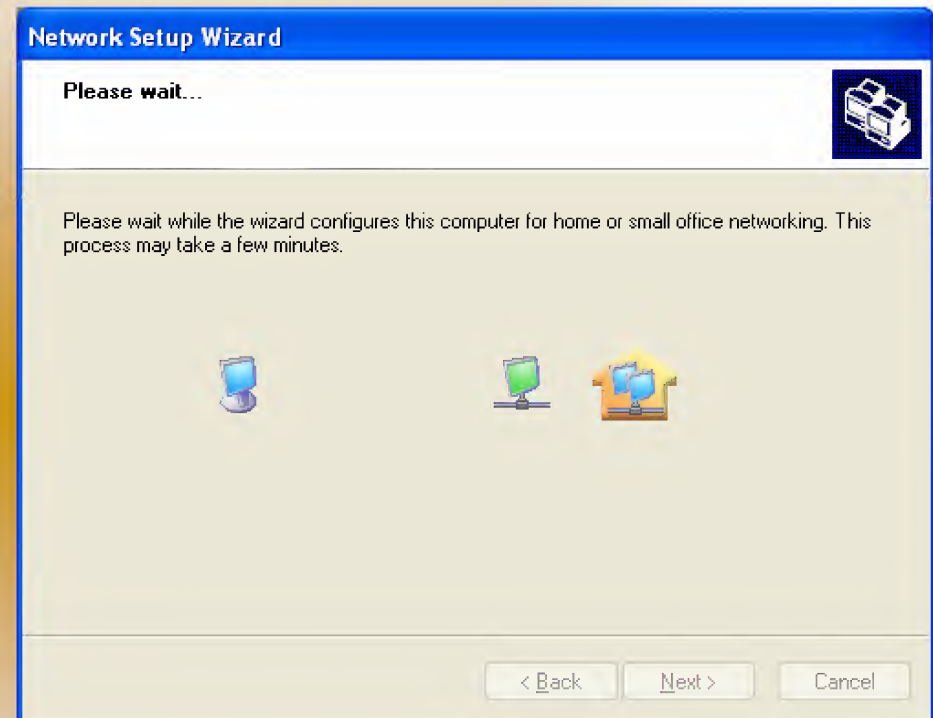
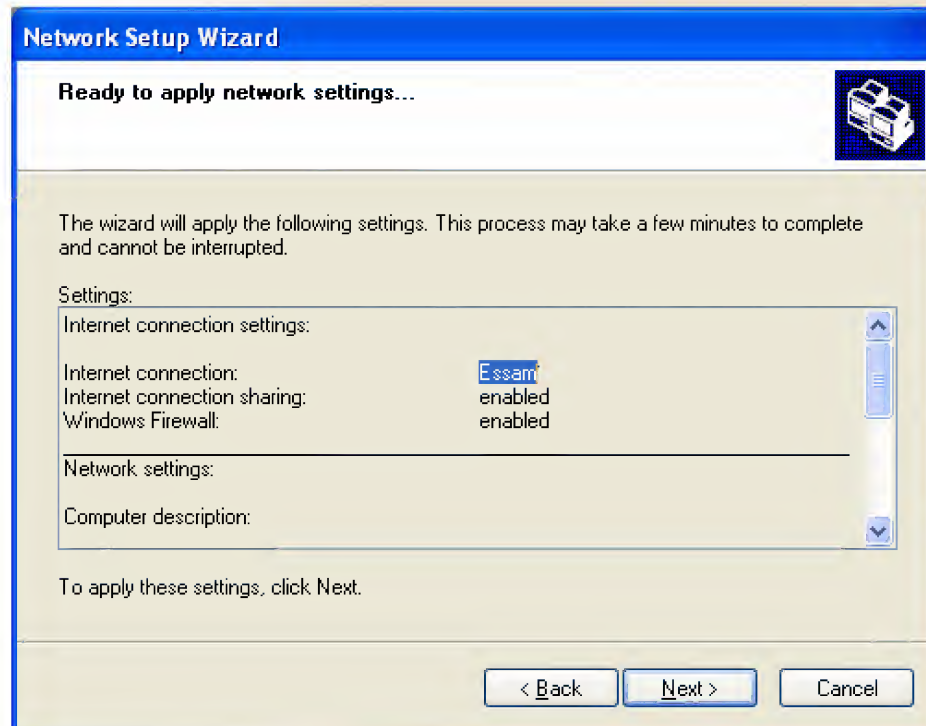
< Back Next > Cancel



Computer Networks

1-٥٣

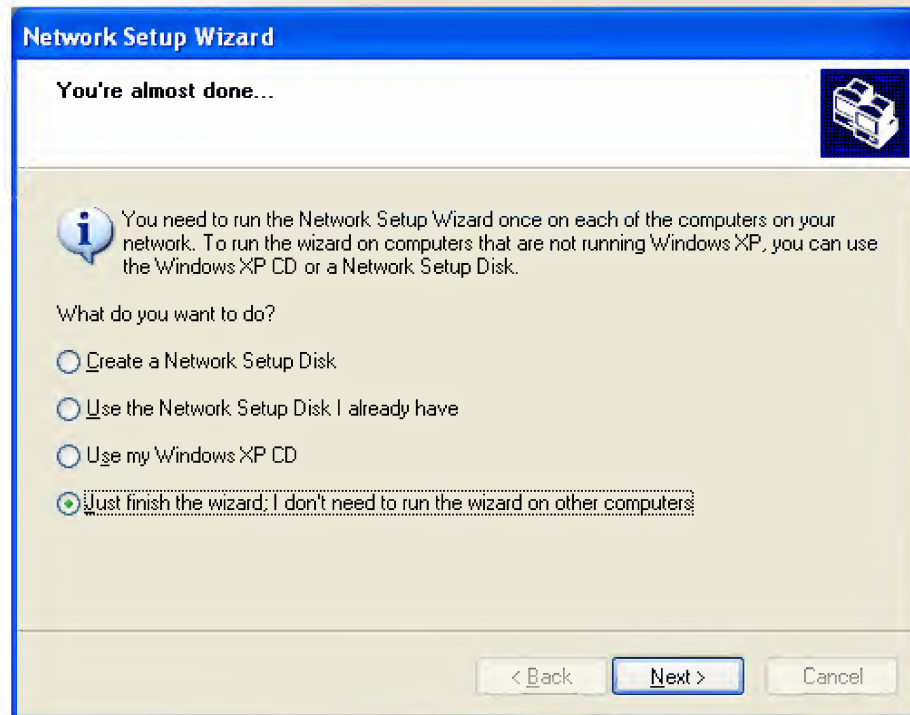
Sharing Connection of Dial up Network



Computer Networks

1-04

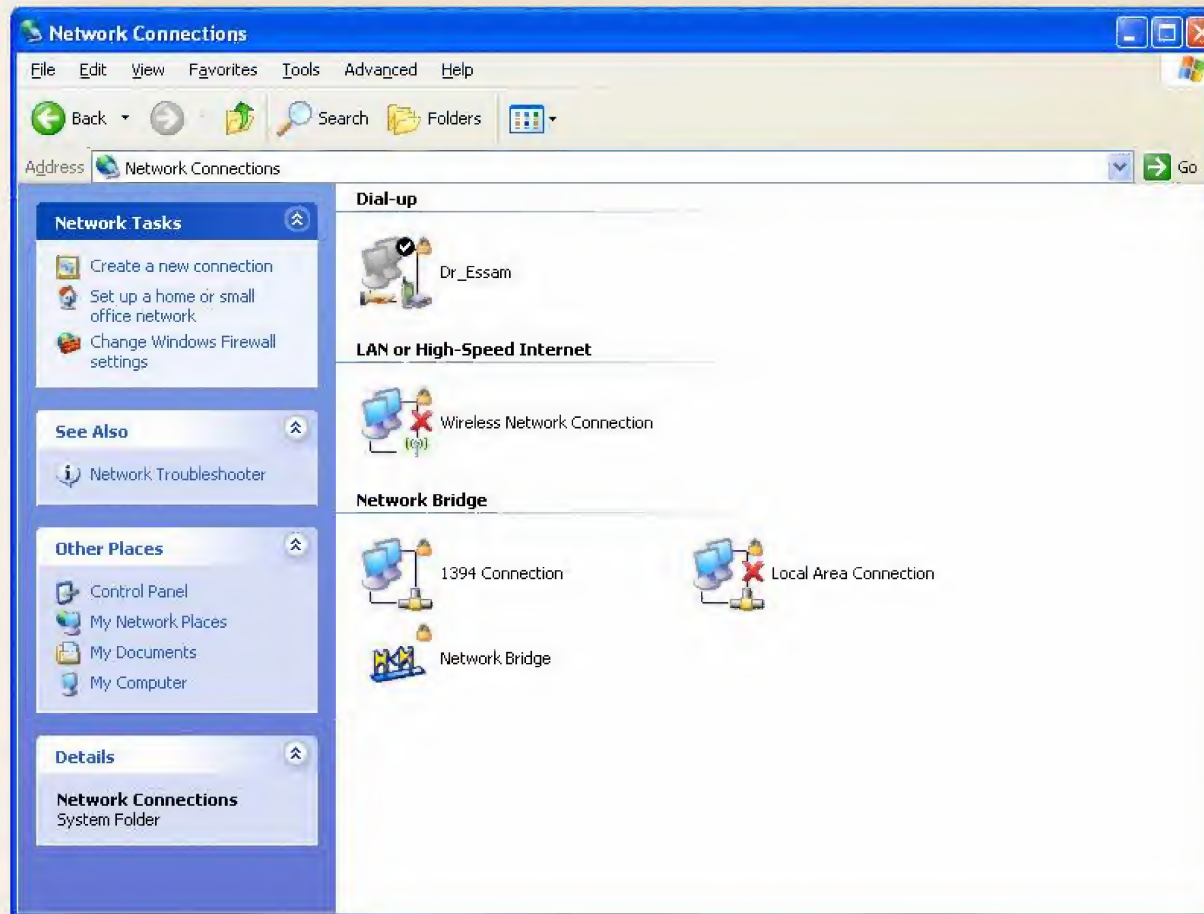
Sharing Connection of Dial up Network



Computer Networks

1-00

Sharing Connection of Dial up Network



Computer Networks

1-٥٦

Confirmation IP



Computer Networks

1-٥٧

Confirmation IP

The screenshot shows the 'Internet Protocol (TCP/IP) Properties' dialog box with the 'General' tab selected. The dialog box contains the following elements:

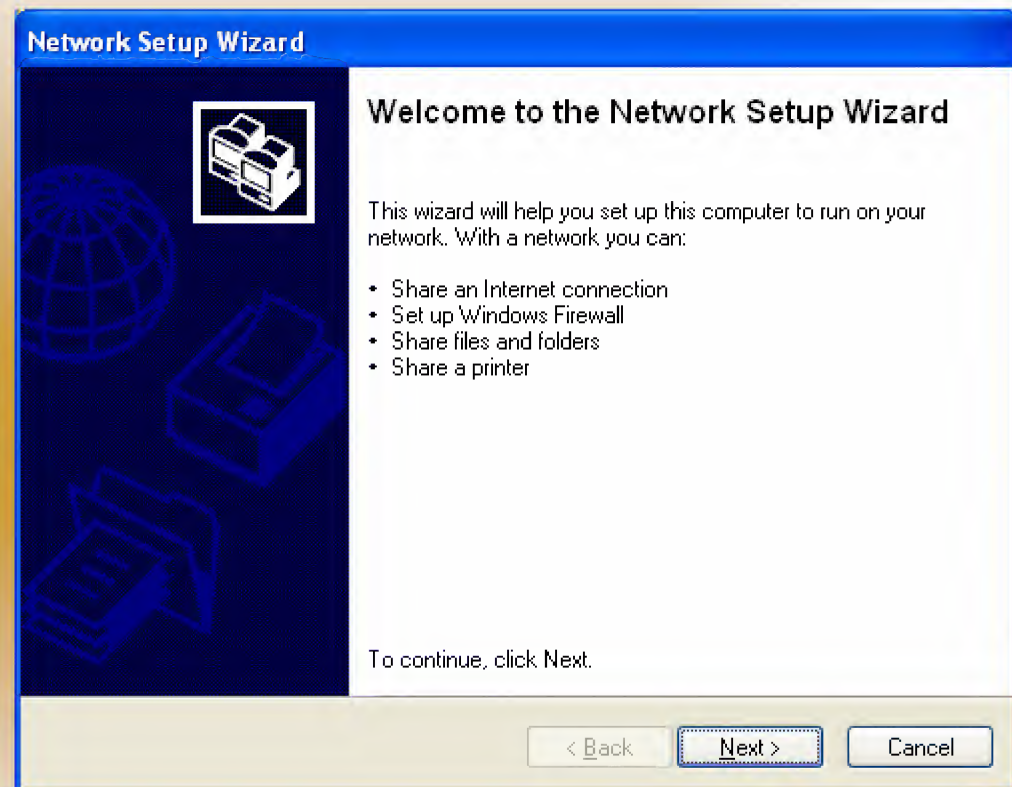
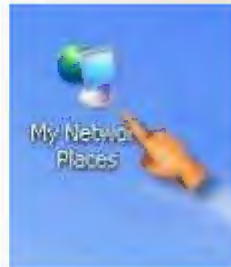
- Title Bar:** 'Internet Protocol (TCP/IP) Properties' with standard Windows window controls.
- General Tab:** The active tab, showing instructions and configuration options.
- Instructions:** 'You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.'
- IP Address Configuration:**
 - ☐ Obtain an IP address automatically
 - ☒ Use the following IP address:
 - IP address: 192 . 168 . 0 . 1
 - Subnet mask: 255 . 255 . 255 . 0
 - Default gateway: (empty field)
- DNS Configuration:**
 - ☐ Obtain DNS server address automatically
 - ☒ Use the following DNS server addresses:
 - Preferred DNS server: (empty field)
 - Alternate DNS server: (empty field)
- Buttons:** 'Advanced...' (disabled), 'OK', and 'Cancel'.



Computer Networks

1-٥٨

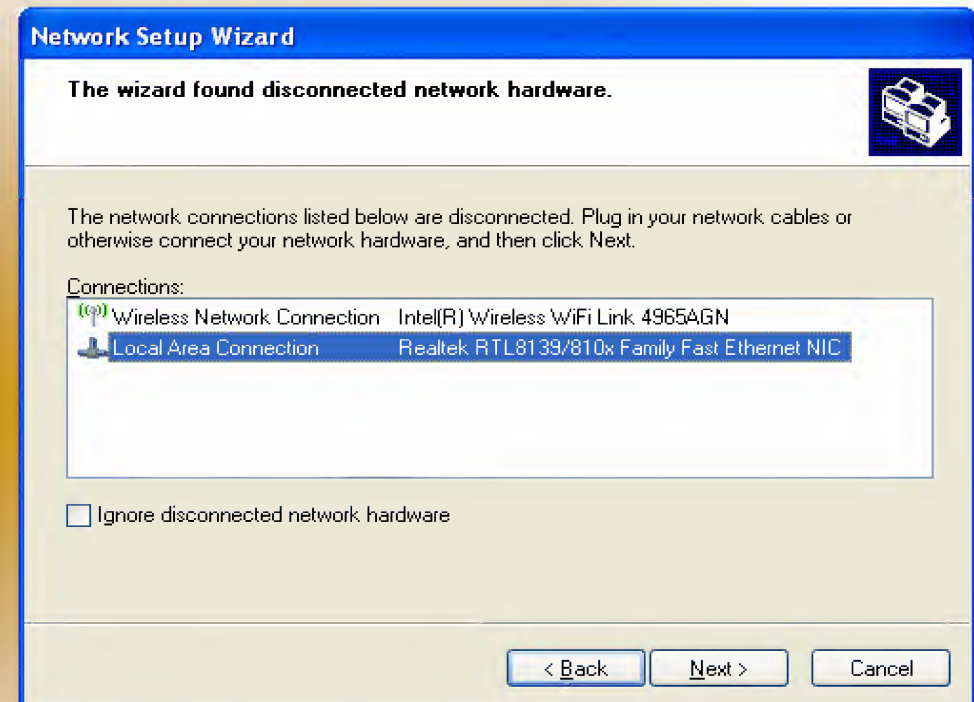
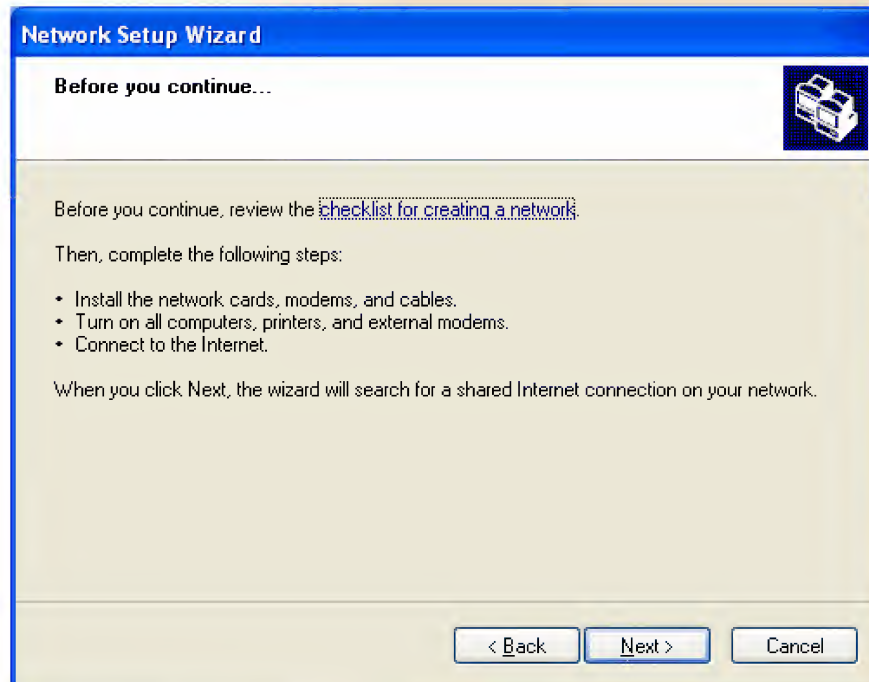
Steps of Another Computer in Network



Computer Networks

1-٥٩

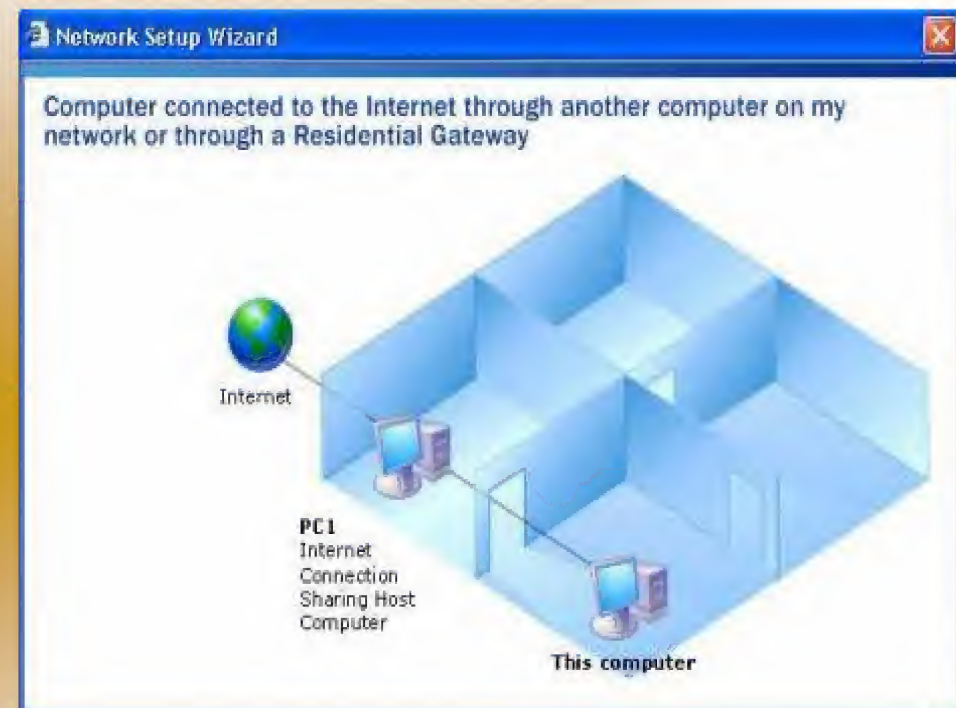
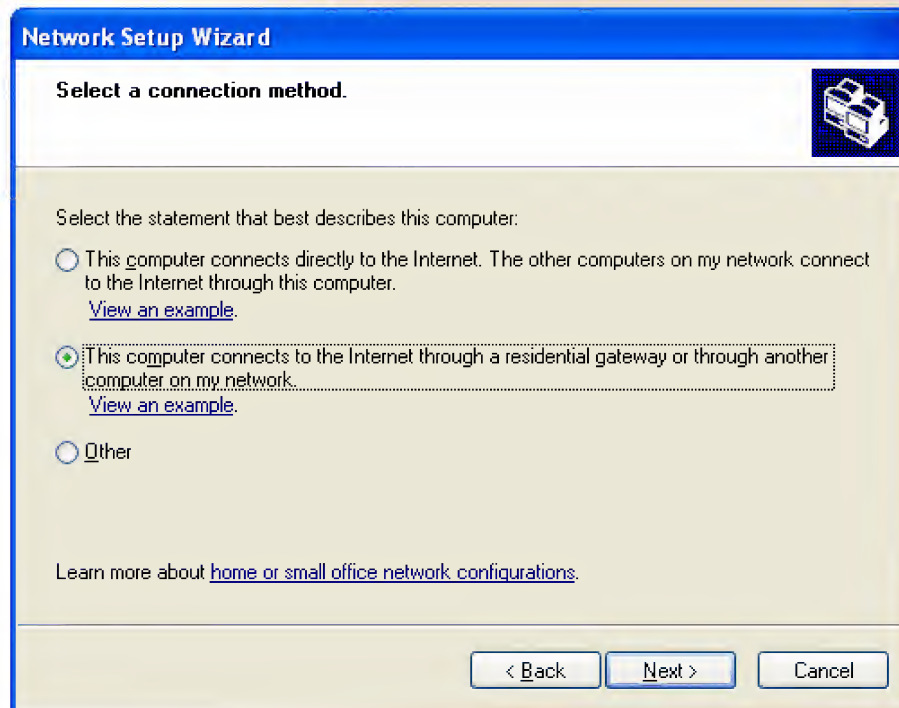
Steps of Another Computer in Network



Computer Networks

1-٦٠

Steps of Another Computer in Network



Computer Networks

1-٦١

Steps of Another Computer in Network

Network Setup Wizard

Give this computer a description and name.

Computer description:
Examples: Family Room Computer or Monica's Computer

Computer name:
Examples: FAMILY or MONICA

The current computer name is PROFESSO-F5E7D9.

[Learn more about computer names and descriptions.](#)

< Back Next > Cancel

Network Setup Wizard

Name your network.

Name your network by specifying a workgroup name below. All computers on your network should have the same workgroup name.

Workgroup name:
Examples: HOME or OFFICE

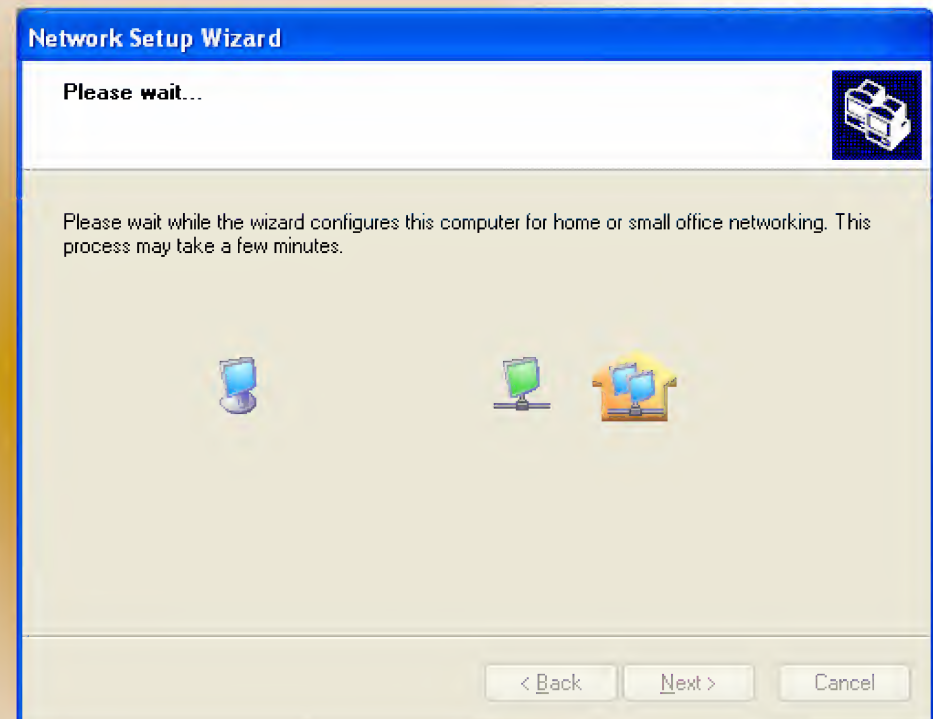
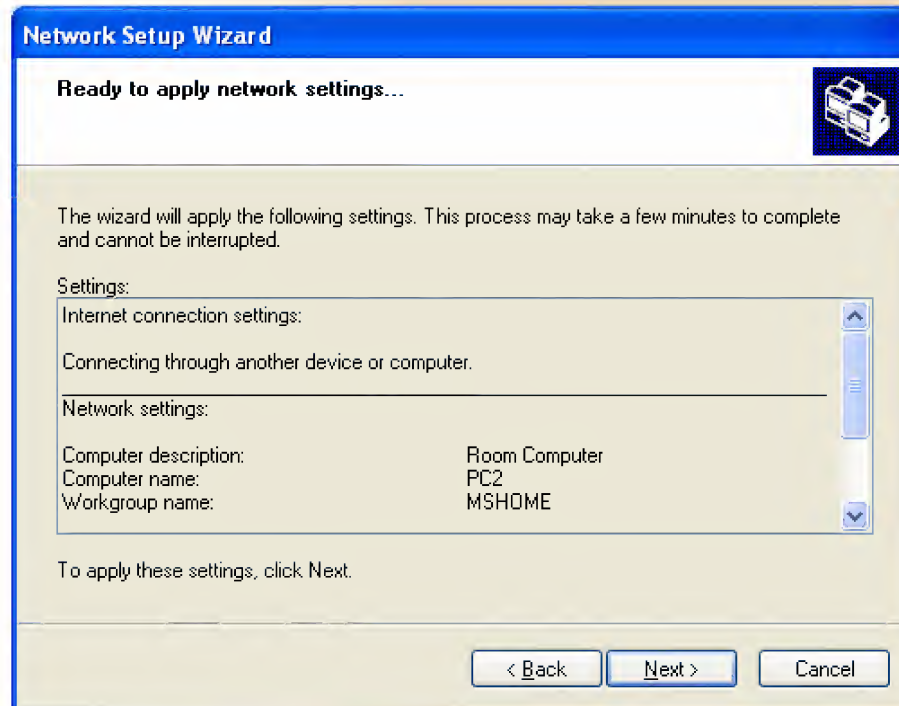
< Back Next > Cancel



Computer Networks

1-٦٢

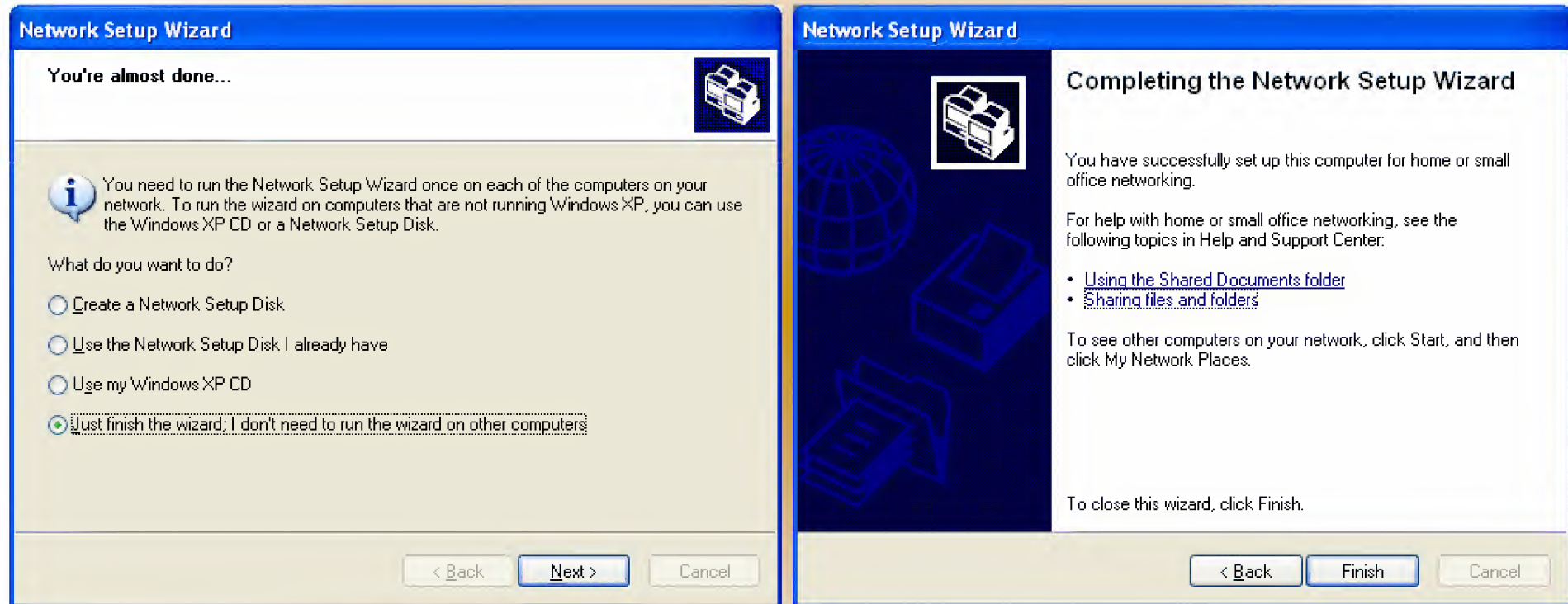
Steps of Another Computer in Network



Computer Networks

1-13

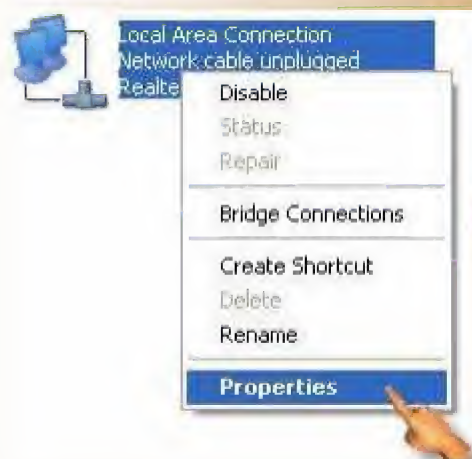
Steps of Another Computer in Network



Computer Networks

1-٦٤

Steps of Another Computer in Network IP and DNS



Computer Networks

1-٦٥

Steps of Another Computer in Network IP and DNS



Computer Networks

1-11

Steps of Another Computer in Network

IP and DNS

Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 0 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 0 . 1

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: 192 . 168 . 0 . 1

Alternate DNS server:

Advanced...

OK Cancel

Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 0 . 1

Subnet mask: 255 . 255 . 255 . 0

Default gateway:

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

Advanced...

OK Cancel



Computer Networks



First Semester for Fourth Year

Faculty of Science
Sohag University
Sohag
Egypt.

2011- 2012

Dr. Essam Othman Abdel-Rahman



Ethernet

Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Types of Ethernet

10Base5, or thick Ethernet

10Base2, or thin Ethernet

10Base-T

10Base-F

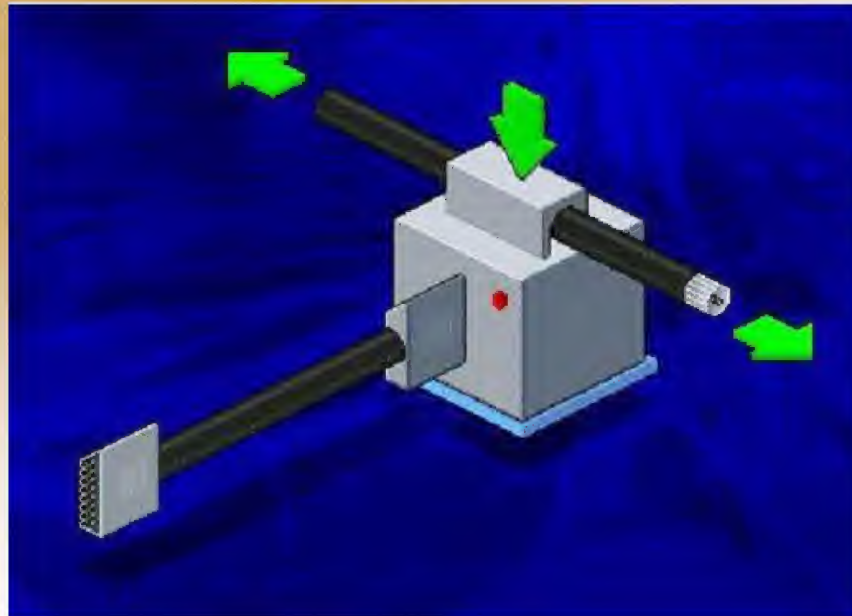
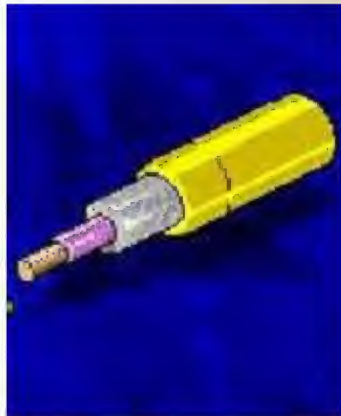


Ethernet

10Base5 (Thick Ethernet)

It resembles a yellow garden hose, with markings every 2.5 meters to show where the taps go.

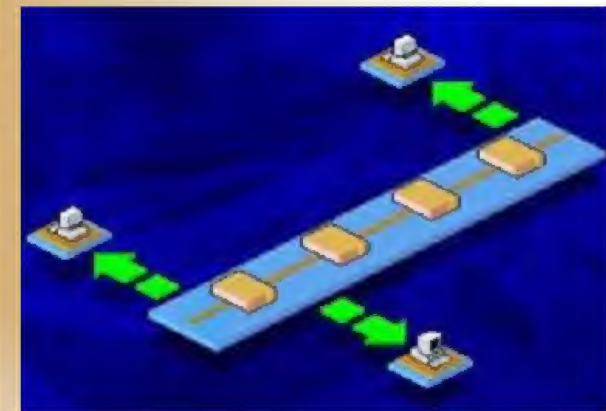
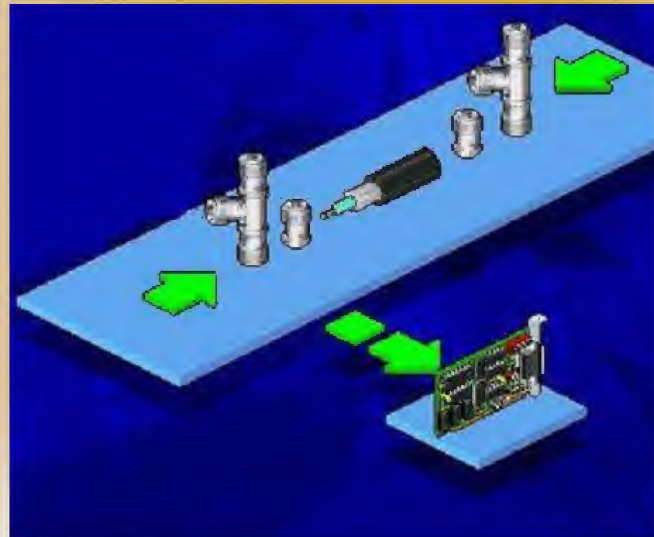
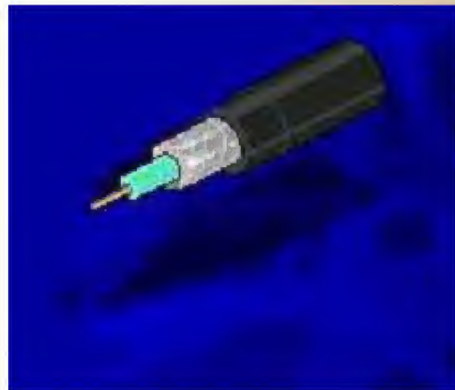
The notation 10Base5 means that it operates at 10 Mbps, uses baseband signaling, and can support segments of up to 500 meters. The first number is the speed in Mbps. Then comes the word "Base" (or sometimes "BASE") to indicate baseband transmission. Finally, if the medium is coax, its length is given rounded to units of 100 m after "Base."



Ethernet

10Base2 (Thin Ethernet)

Thin Ethernet is much cheaper and easier to install, but it can run for only 185 meters per segment, each of which can handle only 30 machines.



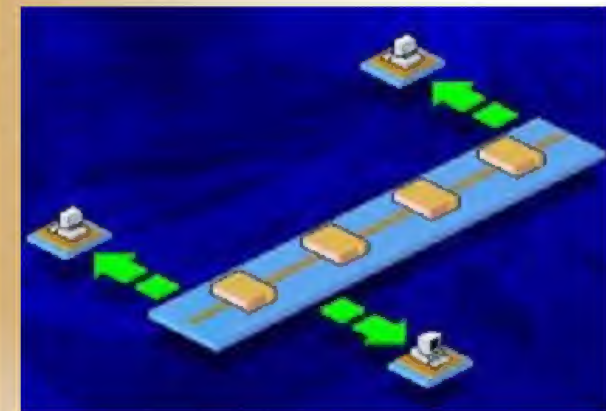
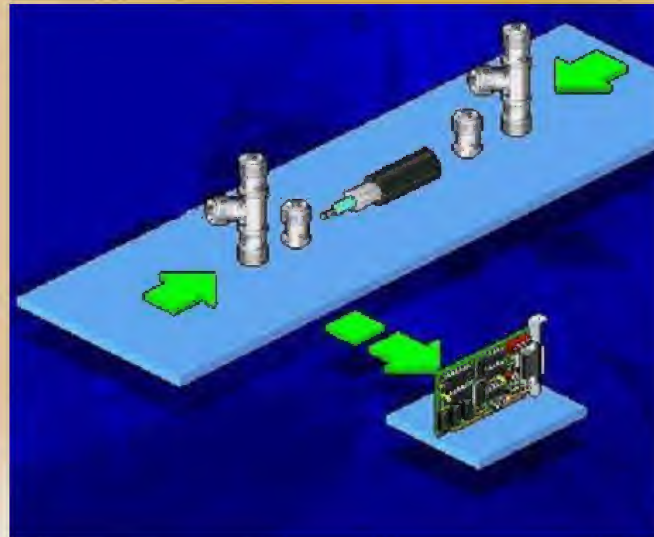
3-4-5 or 5-4-3



Ethernet

10Base2 (Thin Ethernet)

Thin Ethernet is much cheaper and easier to install, but it can run for only 185 meters per segment, each of which can handle only 30 machines.



Ethernet

10Base-T

Usually, these wires are telephone company twisted pairs, since most office buildings are already wired this way, and normally plenty of spare pairs are available.

With 10Base-T, there is no shared cable at all, just the hub (a box full of electronics) to which each station is connected by a dedicated (i.e., not shared) cable.

Adding or removing a station is simpler in this configuration, and cable breaks can be detected easily.

The disadvantage of 10Base-T is that the maximum cable run from the hub is only 100 meters, maybe 200 meters if very high quality category 5 twisted pairs are used.

Nevertheless, 10Base-T quickly became dominant due to its use of existing wiring and the ease of maintenance that it offers.

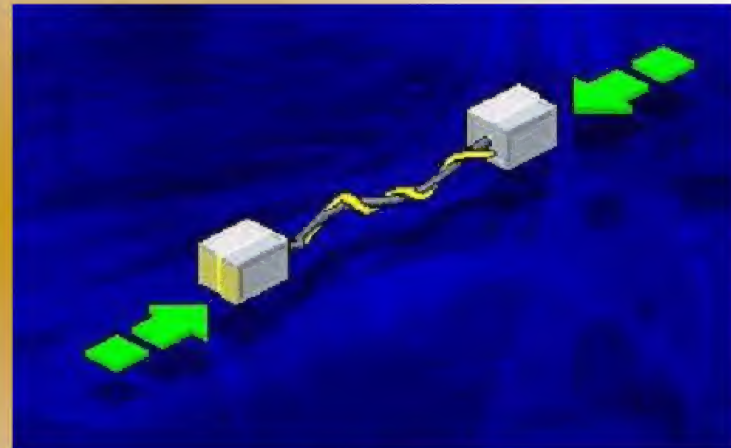
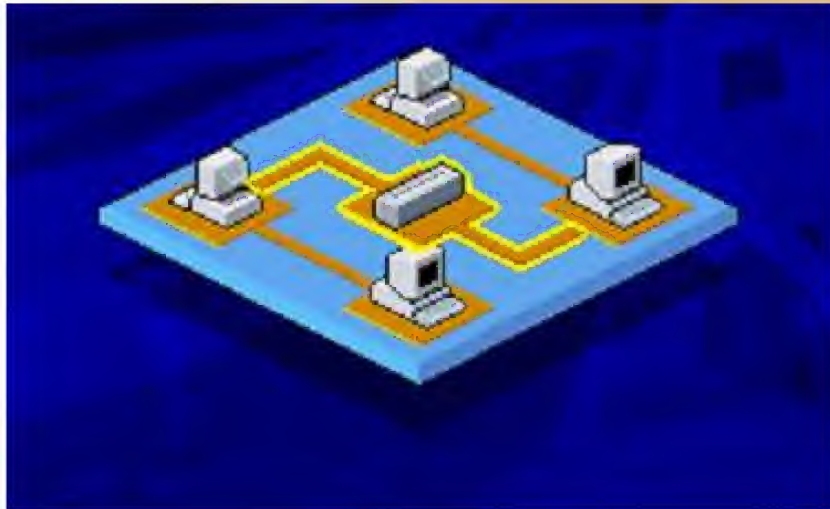


Computer Networks

2-٧٣

Ethernet

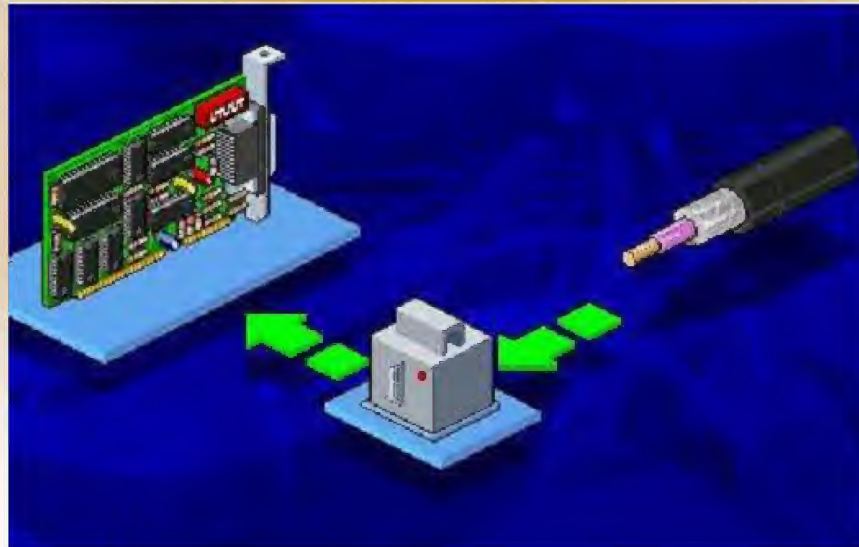
10Base-T



Ethernet

10Base-F

A fourth cabling option for Ethernet is 10Base-F, which uses fiber optics. This alternative is expensive due to the cost of the connectors and terminators, but it has excellent noise immunity and is the method of choice when running between buildings or widely-separated hubs. Runs of up to km are allowed. It also offers good security since wiretapping fiber is much more difficult than wiretapping copper wire.



Ethernet

Name	Cable	Max. seg.	Nodes/seg.	Advantages
10Base5	Thick coax	500 m	100	Original cable; now obsolete
10Base2	Thin coax	185 m	30	No hub needed
10Base-T	Twisted pair	100 m	1024	Cheapest system
10Base-F	Fiber optics	2000 m	1024	Best between buildings

